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A STUDY OF RESOURCES AND INDUSTRIAL OPPORTUNITIES FOR THE PROVINCE OF SASKATCHEWAN

Prepared for:

PROVINCE OF SASKATCHEWAN
INDUSTRIAL DEVELOPMENT OFFICE
ECONOMIC ADVISORY AND PLANNING BOARD · REGINA, SASKATCHEWAN

STANFORD RESEARCH INSTITUTE

MENLO PARK, CALIFORNIA



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December 1959

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PROVINCE OF SASKATCHEWAN
INDUSTRIAL DEVELOPMENT OFFICE
ECONOMIC ADVISORY AND PLANNING BOARD REGINA, SASKATCHEWAN

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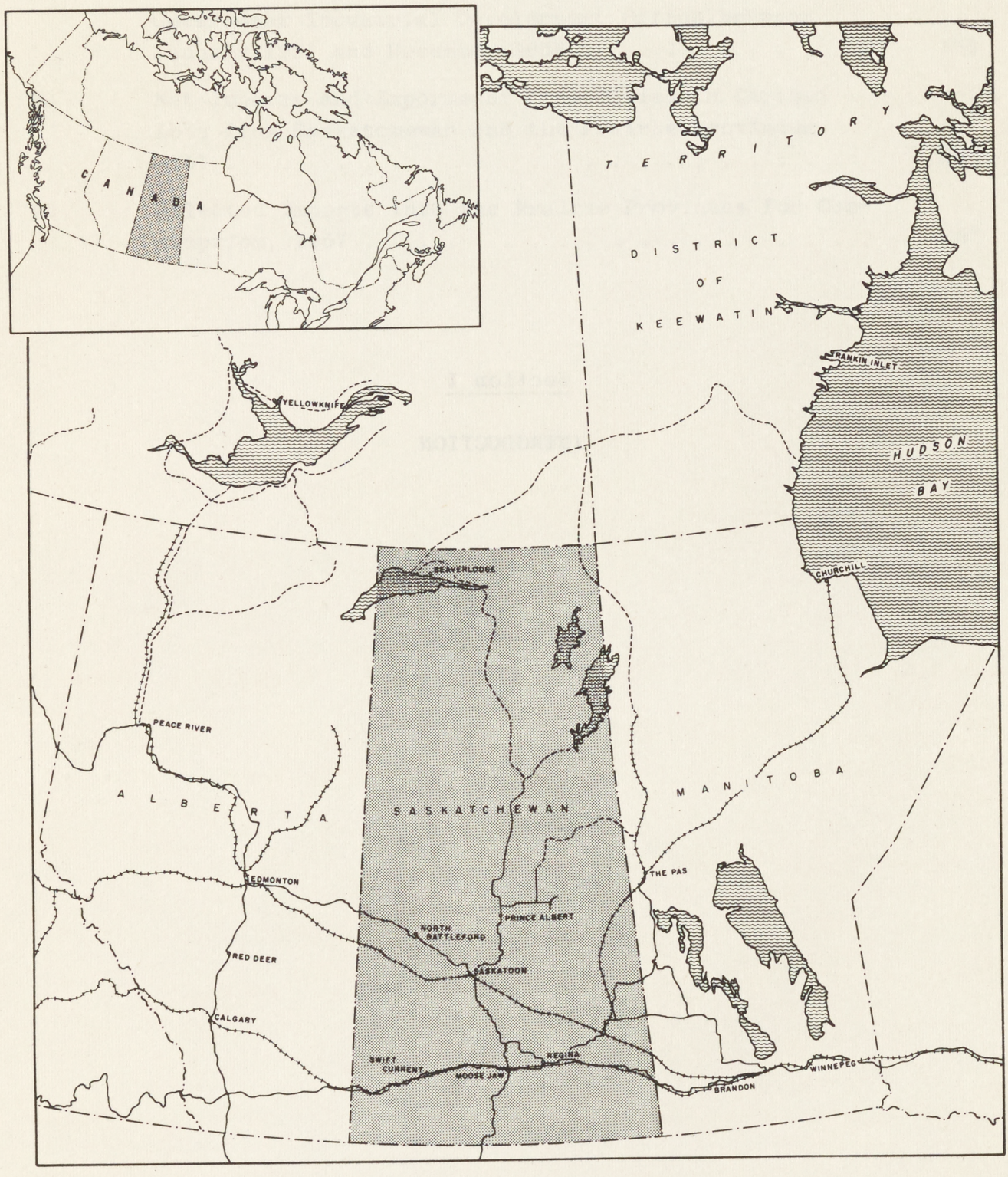
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Section I

INTRODUCTION

SASKATCHEWAN



Section I

INTRODUCTION

Since the end of World War II the economy of Saskatchewan has undergone rapid changes. There has been a marked redistribution of population between rural and urban areas accompanying the rapid increase in importance of industries other than agriculture. For a number of years the loss of rural population was not matched by the gain in urban population, with a resultant net loss in population from the province. However, since 1955, with increasing development of natural resources, particularly minerals, and manufacturing industries, this trend has been reversed. The wide variety of untapped natural resources in Saskatchewan and a firm basis laid in the manufacturing sector of the economy lead to the conclusion that Saskatchewan is on the threshold of considerable industrial development.

The government of Saskatchewan has for many years been aware of the need to diversify and expand the provincial economy to strengthen it against the disrupting social and economic effects that result from fluctuations in the value and volume of agricultural output. This diversification has proceeded to the point that the government needs an objective review of the province's economic growth and of the government's planning and programs relating to this growth. In addition to this review, it was considered that an analysis of potential resource and industrial opportunities would be of benefit in formulating new programs and policies. Other benefits that would result from a study carried out by an independent agency would be the stimulation of interest in industrial development possibilities in Saskatchewan, by both local and outside business and financial interests, and increased activity at the municipal level to promote industry.

Accordingly, Stanford Research Institute; the Economic Research Corporation of Montreal, Quebec; and Sandwell and Company Limited, of Vancouver, British Columbia, were invited to undertake a research program. The objectives of this study were as follows:

1. To review and analyze the economic growth that has taken place in Saskatchewan since 1930.

2. To analyze the factors influencing location of industry in the province.

3. To appraise industrial development opportunities based on natural resources.[1/]

4. To appraise industrial development opportunities for industries other than those based on resources, i.e., those specifically oriented to supplying the Saskatchewan or Prairie market.

5. To review and analyze the government's industrial and resource development program in order to provide constructive suggestions for implementing improvements.

Data were obtained through extensive field work in Saskatchewan, Manitoba, and Alberta, through interviews with representatives of provincial and local governments, universities, and private industry.

A considerable volume of statistical data was assembled by the Economic Advisory and Planning Board and the Industrial Development Office of the Government of Saskatchewan.

The study was made by the Institute's Division of Economics Research under the administrative direction of Charles L. Hamman. L. Victor Riches served as project manager, and Michael Nelson as project leader. Assistance in some parts of the study was provided by Earl F. Beach and D. Harvie Hay of the Economic Research Corporation.

The sections of the report dealing with mineral resources were written by Robert B. Hoy and Richard M. Foose of the Institute's Division of Physical Sciences Research. The section on uranium was written by Richard R. Tarrice and the analysis of fuel minerals was made by Henry W. Laurant and Carl A. Trexel, Jr. Other Institute personnel who cooperated in specialized market aspects were Sherman H. Clark, William T. Sutphen, and J. Morse Cavender.

1/ As a part of this appraisal a detailed study was to be made of the feasibility of a pulp and paper mill development based on the forest resources of the province. The forestry report is submitted as Part II of the comprehensive report, under the title Prospects for Pulp and Paper Mill Development in Saskatchewan, Canada. The financial data, engineering estimates, and draft of this report were prepared by Sandwell and Company Limited.

The Institute wishes to acknowledge the cooperation of all Saskatchewan government departments in facilitating collection of information and arranging appointments throughout the Prairie Provinces. Appreciation is extended particularly to D. H. F. Black, Director of the Industrial Development Office, and T. K. Shoyama, Secretary of the Economic Advisory and Planning Board.

Section II

SUMMARY AND CONCLUSIONS



City of Saskatoon

SASK. GOV'T PHOTO

Section II

SUMMARY AND CONCLUSIONS

An analysis of Saskatchewan's industrial and resource potential requires, first, consideration of the factors which have governed the development of the province to date. Closely related to the historical relationships in the growth of the provincial economy are the factors governing location of industry in the province. Within the framework defined by historical developments and existing location factors, the resources of the province have been examined for their suitability and potential as a basis for industrial development mainly oriented to export markets in raw materials, semiprocessed, or finished goods. To complete the analysis, it was necessary to examine the possibilities for development of industries predicated on the manufacture of finished goods for sale primarily in the Prairie market area encompassing Alberta, Saskatchewan, and Manitoba.

Economic Development of Saskatchewan to 1959

The province of Saskatchewan was established in 1905 and in the course of its 54 years of history has been among both the most prosperous and the most depressed provinces in Canada. Prior to the depression of the 1930's the economy expanded consistently through railway colonizing efforts and production of wheat in vast areas. Saskatchewan, during this period, was a very attractive location for many immigrants from Europe and eastern Canada. In 1930, with the world-wide depression, the situation changed abruptly. A drastic fall in world wheat prices was accompanied by unusually severe and prolonged drought conditions extending over the Great Plains area. With its dependence upon wheat, Saskatchewan suffered more severely from the depression than any other province. By the mid-30's, the population trend was sharply reversed, and during the early war years an outflow of people was rapidly accelerated by the employment pull of expanding wartime industries in the St. Lawrence Basin.

The period after World War II marked a new era in Saskatchewan's economic growth. Wheat yields and prices improved during the war years, and remained high throughout the late 1940's to reinstate the prosperity of the province. An important factor in this new prosperity was the discovery and extensive development of marketable oil and uranium in the late 40's and early 50's. The combination of higher agricultural income

and development of mineral resources initiated the spurt of activity in commerce and industry which has been accelerating ever since.

Exploration for oil led to the discovery of potash, and the initiation of new major industry. Other important developments took place in sodium sulphate, natural gas, and clays. The net value of mineral output in 1958 was $164 million, 19.4 percent of the provincial total. These resource-based industries, in turn, provided a market for products that could not have been manufactured profitably in Saskatchewan in the past.

The increasing urban population required to support these new industries also provided a sufficient concentration of consumers to enable the establishment of manufacturing industries specifically oriented to these new local markets. Thus, the increasing industrial activity and population growth which created larger markets for goods and services have led to an accelerated tempo of industrial development in Saskatchewan. The population of the nine major centers in the province increased 47 percent between 1946 and 1958. During the same period, the value added by manufacture in constant dollars increased 112 percent, and total capital investment rose from $241 million in 1948 to $612 million in 1958.

The experience of the last three decades has demonstrated both the need and potential for diversification in the province's economic base. Since the 1930's it has been recognized that extreme dependence on wheat was largely responsible for the excessively severe effects of the depression. This has led to increasing pressure for both agricultural diversification and expansion of sectors of the economy other than agriculture. Opportunities for varying the pattern of agricultural output are limited, however, by physical conditions of soil and climate. The major hope for stabilizing the provincial economy thus lies in the development of minerals and other natural resources, the introduction of new manufacturing and service industries, and the accelerated growth of previously underdeveloped industries.

Factors Governing the Industrial Potential of Saskatchewan

The future industrialization of Saskatchewan will be a direct function of the natural and human resources available in the province (or which can be readily imported), combined with world economic and political conditions, provincial government policy, and all other location factors, such as transportation, market, and labor relations, which tend to encourage or discourage investment either by local or outside entrepreneurs.

Natural Resources

Saskatchewan is fortunate in having a wide variety of natural resources, both renewable and nonrenewable, which are conducive to the location of large-scale export industries. The renewable resources are agriculture (agricultural land), forests, fish, fur, tourism, and recreation. The nonrenewable resources may be subdivided into metallic minerals, which include cadmium, copper, gold, iron, lead, magnesium, nickel, platinum, selenium, silver, tellurium, uranium, and zinc; industrial minerals, which include known deposits of bentonite, clay, limestone, potash, pumicite, sand and gravel, silica sand, sodium chloride, and sodium sulphate; and fuel minerals, which comprise coal, natural gas, and petroleum.

Agriculture

Agricultural land is Saskatchewan's most valuable natural resource. Agriculture has undergone considerable changes since 1930, and many changes are still in process which will influence the future industrial pattern in the province. The important changes are:

1. The trend of population away from the farm with consequent consolidation of land areas and increased use of machinery and other farm inputs, such as fertilizers and pesticides;

2. The trend to diversification, particularly the increasing importance of cattle;

3. Improved technology leading to higher output per unit of input, and therefore greater prosperity in rural areas;

4. Development of irrigation, particularly the South Saskatchewan River project which ultimately is expected to bring water to half a million acres, allowing diversification of crops and livestock; and

5. Development of land, both that which is already settled and that which is currently unoccupied.

These potential changes in the volume, variety, and quality of agricultural production and potential changes in the organization of production will have an important impact on the province's industrial economy for the following reasons:

1. Improved efficiency and the resulting increase in per capita income of the farm population will result in higher total purchasing power and will therefore provide a basis for a larger Saskatchewan market in spite of reduced rural population.

2. To effect the production and development outlined above will require large capital expenditures by farmers, co-operatives, corporate interests, or government agencies on items such as land development, implements, fertilizers, and buildings.

3. Expansion and diversification of farm products may displace some Saskatchewan imports, such as potatoes, and a limited number of other vegetables, thus making the province more self-sufficient.

4. Development of new industries or expansion of existing industries may take place in the processing of food, fiber, and hides.

Agriculturally based industries are already well established in Saskatchewan. Any expansion in this field is governed by (1) the over-all development of the Prairie, Canadian, and overseas markets, (2) the development of crops and livestock to allow production of new items, and (3) changes in technology leading to the manufacture of new products from the same agricultural raw materials.

The province's major crop is wheat, and flour milling the most important industry based upon it. Opportunities for an expanded flour milling industry are limited. Increasing population in the Prairies should, however, provide opportunities for flour-using industries manufacturing such items as macaroni, spaghetti, breakfast foods, semolina, bread, and bakery products.

The basis of other food processing industries may be provided by new products, such as vegetables grown in irrigated areas. Canning is unlikely in view of the short growing season and competition from other parts of North America. Processing of potatoes and freezing of certain vegetables appear to offer the best possibilities. With a likely increase in livestock output and increasing demand for packaged meats, it would appear that the slaughtering and meat packing industry is a candidate for expansion.

Apart from food processing, the major possibilities for agriculturally based industry are tanning and production of chemicals and oils. Leather tanning is a possibility which would also attract miscellaneous leather products manufacturers to locate in Saskatchewan. Technology of obtaining starch from wheat which would be competitive with imported cornstarch has developed to the point that a starch industry could be established. Another possibility is the production of fermentation alcohol from wheat. The market does not favor production of industrial alcohol in the province, but the production of distilled liquors appears to be a distinct possibility. Due to market conditions in the paint industry and competition from soybean oil and synthetics, little expansion is expected in the linseed oil industry. However, there is a possibility for production of rapeseed oil.

Forests

Saskatchewan has about 24.1 million acres of accessible commercial forests which comprise a mixture of hardwood and softwood varieties. The primary softwood species are white spruce, black spruce, and jack pine. The primary hardwood species are white poplar, black poplar, and white birch. The prospects for increasing sawtimber capacity are limited for the next twenty to twenty-five years. There is a large volume of pulp timber available on a sustained yield basis. With sound management practices and maintenance of good access, Saskatchewan's forest resources should be able to supply wood for a stable forest products industry in the future.

The important gap in utilization of forest resources is in pulp production, which should develop in response to a rapid increase in North American demand for paper and paper products expected in the next ten to fifteen years. Ultimately, possible pulp production may be converted locally to paper and paperboard. However, a number of other possibilities exist for industries utilizing wood waste and lumber. These include expansion of remanufacturing industries, such as planing mills, and the manufacture of sash and doors, plywood, composition board, and laminated construction timber. Industries which might be based on lumber include the manufacture of furniture and wood novelties, such as toys, games, and picture frames.

Fish and Fur

Fish and fur are important resources for the people native to the northern regions of the province; however, the value of the combined production from these resources is less than 2 percent of the provincial

total output. The relative importance of these two resources is likely to decline. The only industrial expansion based on fish, in addition to existing filleting, freezing, and packing plants, is likely to be an extension of the processing carried out by these plants, such as precooking, smoking, packaging, and preparation of special items, such as patties or fish sticks.

In certain specialty items, such as fur caps, where the market is not dictated by fashion, there is no reason why a local fur industry should not compete in both Canadian and foreign markets.

Recreation

The major recreational resources of Saskatchewan are fishing, hunting (including game bird shooting), and water sports. The northern region, which includes the forest belt and Precambrian shield area, is a major attraction for nonresident tourists. In addition to the abundance of fish and game animals and birds, an important factor contributing to the attractiveness of the tourist resources is the unspoiled wilderness nature of the northern area. The two main factors limiting the utilization of these resources are the remoteness from major population centers on the continent, and a climate in which the recreation season is limited to about four months.

Metallic Minerals

The potential for finding additional deposits of metallic minerals in Saskatchewan is believed to be excellent. However, the Precambrian area has not been mapped or examined in sufficient detail to reveal the real possibilities. The areas around Lac La Ronge, Cree Lake, and Lake Athabaska are regarded as most favorable because they are relatively more accessible and certain parts have been geologically mapped in some detail. The area extending from the edge of the Precambrian border in central Saskatchewan to the northeast corner of Saskatchewan is not so well known, but is believed to contain early volcanic and sedimentary rocks which are considered favorable for base metal mineralization.

An area of more than 20,000 square miles extending from Lake Athabaska south to Cree Lake and from the Alberta border east to Wollaston Lake is underlain by the Athabaska series, consisting largely of sandstone. The rocks containing the uranium deposits north of Lake Athabaska project under this area.

A structure favorable for mineralization extends through central Manitoba along a southwesterly trend. Major nickel deposits have been located along this trend at Moak Lake and Thompson. The same structure projects into Saskatchewan in the Precambrian area under the sediments, probably near the line of the Saskatchewan River.

Uranium. Uranium has been the most important metallic mineral in the province in recent years. Production is firmly established on the basis of well-defined reserves, efficient mining operations, and contractual agreements for at least the next two years. After early 1962 relatively large quantities of provincial and, in fact, national uranium production will become available for commercial use. The market will be small, and it does not seem probable that all available production will be needed. It does appear, however, that mines in Saskatchewan will be able to compete favorably.

In the late 1960's there will be an expansion of the commercial market and at that time Saskatchewan can look forward to selling a much larger portion of its production. In the 1970's production capacity will have to be expanded and producers can look forward to a substantial demand for their product.

Iron and Steel. The iron and steel industry has recently come into prominence in the province with a steel mill scheduled to go into production in 1960, and exploration of the Choiceland iron ore deposit in 1959. The market for Saskatchewan iron and steel would be the western area of North America. It is expected that ore production in the western states and British Columbia will be limited to a level of about 10 million tons, compared with the 7-8 million ton average for the past five years. In these areas potential production is limited by the magnitude of reserves and by the fact that the reserves are scattered in many small deposits which make recovery uneconomic. It is expected that in the western states and provinces there will be a substantial gap between production and consumption in the order of 6 million to 20 million tons of ore annually between 1975 and 2000. Saskatchewan is obviously in a favorable position to fill this gap in competition with South American and eastern Canadian suppliers.

In the case of steel fabricating and processing industries in the province, specific opportunities include the manufacture of pipe (a mill has already been established), galvanizing sheet metal, and manufacture of metal furniture and other sheet metal products. The following factors are favorable to further expansion:

1. A local source of supply in the form of the new steel mill currently under construction (likely to result in more competitive prices for specific types of finished steel).

2. The increase in demand for steel in the Prairie Provinces, and particularly in Saskatchewan, for uses such as utilities, construction, mining and milling operations, and the oil industry.

3. High freight rates on fabricated products from the East which will reduce competition from that area.

Limiting the future growth will be:

1. The restricted market as influenced by freight rates and the relatively sparse, though increasing population in the Prairie Provinces.

2. The freight rates on specific types of steel not available locally which must be transported from eastern sources.

Copper, Lead, and Zinc. In the case of copper, it is unlikely that bars or ingots will be produced in Saskatchewan for two reasons. Local demand is insufficient to make new refineries economic, and large refineries already exist at Trail and in eastern Canada. Thus, industries developed in the province which utilize copper cannot strictly be regarded as resource based, as their raw materials will have to come from eastern refineries. Therefore, it is likely that copper will continue to be a raw material export from Saskatchewan, and industries in the province utilizing copper are most likely to be market oriented. The same situation also applies to lead and zinc.

Industrial Minerals

Magnesium. The potential for economic magnesium production, either from lakes or salt beds, appears to be sufficiently good over the long term that investigation seems warranted, in view of projected increased demand for this metal. The major competitors of potential Saskatchewan producers would be the plants producing magnesium from seawater, which, although utilizing water with lower magnesium concentration than that found in Saskatchewan lakes, currently have excess capacity and are close to the largest markets. Any Saskatchewan production of magnesium would most likely be oriented to markets in the United States

Midwest, and western Canada. Industries based on Saskatchewan's magnesium resources would be primarily in extraction and refining to produce magnesium compounds and possibly magnesium metal. These products in themselves would not provide the basis for additional industry in the province but could provide important ingredients for a possible chemical industry.

Potash. Undoubtedly, the most important resource development that has taken place in Saskatchewan since the first significant oil production in 1944 was that of potash. Production in commercial quantities from the plant of the Potash Company of America at Patience Lake began in November 1958. Four potash mines of the size of the two now being developed in Saskatchewan could produce the current annual United States requirements of approximately 1.7 million tons. Clearly, new markets and new uses are necessary to develop fully the tremenduous potential of this resource.

The long-term growth of potash consumption is accepted as certain; however, the present market is depressed by overexpansion. It is expected that demand will again catch up with supply in 3 to 6 years, unless, of course, expansion such as that now under way in Saskatchewan should be carried to excess. Assuming that no unforeseen mining problems are encountered, the Saskatchewan potash industry should compete well in the world market with established plants in New Mexico, California, Utah, and Michigan, as well as Germany, Russia, Israel, Jordan, France, and Spain. The most obvious overseas market is Japan. Lower labor costs in most countries outside North America may cause the prices of foreign production to become more and more competitive in domestic as well as world markets, particularly as foreign mines become more and more mechanized.

Sodium Sulphate. The Saskatchewan deposits of sodium sulphate provide a high-quality product, competitive with other natural deposits in refining costs. Major competition in the past has been from by-product sodium sulphate and in the West Coast market from deposits in California. It is estimated that the demand for sodium sulphate by the pulp industry will continue to increase in spite of declining usage per ton of pulp. On the assumption that by 1975 average use of salt cake will be 100 pounds per ton of pulp, the total annual consumption by Canadian mills is estimated at 230,000 tons (the amount of salt cake required by United States and Canadian mills to supply the United States paper market is estimated at approximately 1.2 million tons). Annual United States production of sodium sulphate is currently at approximately

three-quarters of a million tons, with about a quarter of the United States salt cake requirements being imported. Thus, there is a substantial market in the United States which Saskatchewan salt cake can supply in competition with European sources. With the opening of the St. Lawrence Seaway, Saskatchewan may expect increasing competition from Europe in supplying Ontario and United States midwestern mills.

The market for sodium sulphate in industries other than pulp is mainly in detergents, glass, and chemicals.

Sodium Chloride. Present production of sodium chloride is limited by demand to one deposit located in western Saskatchewan, at Unity. Future production of salt in Saskatchewan is limited only by markets. Each mine of the size of that of the Potash Company of America at Patience Lake will produce, in addition to the potash, about 2,500 tons per day of sodium chloride.

There is little potential for any large expansion in the production of table salt, and the major potential industrial use in the Prairie Provinces is in the manufacture of chlorine, caustic, and hydrochloric acid. The location of future chlorine-caustic plants can be influenced by raw material costs, but salt availability does not appear critical. Salt is now commercially mined in all three Prairie Provinces. Thus, future chlorine-caustic plants in western Canada will probably be constructed where they can best serve regional markets. Growth of market demand in the Prairie Provinces and in western Ontario will justify additional capacity. The establishment of a plant in Saskatchewan may be retarded because of the province's proximity to Alberta and the expansion potential of existing Alberta producers. Captive production to supply a large bleached pulp mill could be readily justified if a plant in Saskatchewan had a surplus of available electric power.

Other Industrial Minerals. Other industrial minerals with good potential for development are clays, bentonite, and pumicite. Expanded utilization of Saskatchewan's clay resources appears most likely in the form of increased output of products currently under manufacture. The bentonite deposits of the province are being considered, and eventual production seems likely from both the swelling and nonswelling types. All pumicite deposits are reported to be under lease, but no production appears imminent. Limestone and silica sand, because of either limited size of deposits, poor quality, or remote location, have poor immediate potential. Commercial production of helium from the area north of Swift Current is currently under study. Expanded production of sand and gravel is directly related to the construction industry in the province.

Fuel Minerals

At present, fuel minerals exist principally in the form of reserves which are being tapped in only a relatively small way compared with their actual potential.

Oil and Natural Gas. Recoverable crude oil reserves are projected to be 2.2 billion barrels by 1970. Approximately half of the oils produced are medium to light gravity which command premium prices as crude. Since much of Saskatchewan's oil production is located to the east of the major refining centers in the province, but is accessible to the Interprovincial Pipeline, it is logical that this crude oil move to more easterly markets both in Canada and in the United States. Only about one-fifth of Saskatchewan's crude oil production is sold to Saskatchewan refineries. Before 1955 the bulk of Saskatchewan crude was refined in the province. The increased production since then, however, has been sold in Ontario and the United States, and in 1957 Ontario emerged as the largest market. Growth of the Ontario market would tend to stabilize the market to some extent in the event of United States import restrictions. Saskatchewan refineries, by and large, find transportation costs less if they purchase crude from Alberta rather than from their own province. For this reason, almost three-quarters of their supplies are bought from that province. Saskatchewan, however, is a heavy net exporter of crude. More than twice as much crude oil is sold by Saskatchewan producers than is consumed by local refineries.

There are three factors which govern the market for the Saskatchewan oil industry: (1) the future demand for crude in markets in eastern Canada and the United States Midwest, (2) Saskatchewan's position in supplying these markets in competition with Alberta, and (3) United States policy toward imports from Canada and Canadian policy toward imports from South America. Demand for western Canadian crude oil in eastern Canadian markets, as well as in the United States markets which can be economically served by western Canadian crude oils, is expected to increase from the 1958 level of about 240,000 barrels per day to over 1 million barrels per day by 1975. Saskatchewan has an obvious transport advantage, being closer to markets than Alberta. Also, due to the structure of the Canadian prairies, Saskatchewan wells are shallower than those in Alberta, and therefore production costs are somewhat lower. United States policy is unpredictable, as it will be largely governed by the supply position of domestic producers; Canadian policy on import duties is currently under consideration.

Offsetting these two advantages is the fact that Alberta is in a dominant position in the oil industry and therefore has a great deal more flexibility in supplying the type of oil most in demand at competitive prices. In addition, records of oil exploration (which currently show curtailed activity in both provinces because oil company profits are suffering from overproduction) indicate that the ratio of dry holes to productive ones will increase in Saskatchewan relative to Alberta, thus reducing the production cost advantage of Saskatchewan. Although a relatively high proportion of Saskatchewan's crude production is sour, this has not been a particularly serious disadvantage. Some refineries have been especially designed to handle this crude. The operators of these refineries are reluctant to switch to sweeter crudes due to the cost involved in modifying their plants. Thus, to a limited extent, this sour crude has a captive market.

In actual fact, Saskatchewan oil is not competing with Alberta production on a provincial basis. The same oil companies produce crude in both provinces, and therefore will try to supply their eastern refineries by the most economic method. The experience of the last two years, in which Saskatchewan production has increased and Alberta production has decreased, is a good indication of Saskatchewan's relative position during a period when the oil industry was operating specifically to reduce costs. The latest figures available on oil companies' nominations (advance orders) show September 1959 to be a record month for Saskatchewan; also, for the first time there were orders for more medium than light crude.

Proven and possibly recoverable reserves of natural gas are estimated to be 2.98 trillion cubic feet by 1970. The Saskatchewan production and potential is insufficient to meet the provincial demand. It appears likely that the Saskatchewan Power Corporation will draw gas in quantity from Saskatchewan fields for approximately 30 years. However, with the projected expansion in Saskatchewan demand and in the absence of substantial new reserves being located in the province, the major portion of the gas consumed is expected to be supplied from Alberta.

The only industry of importance in addition to oil refining that could be based on oil and gas resources is petrochemical manufacturing. The province has an abundance of raw materials to support such a plant. The long-term growth in demand for petrochemicals is assured. However, in view of (1) the increased competition currently being met by Canadian chemical producers in Europe from the European industry, and (2) the existing pattern of the industry in the Prairie Provinces, eastern Canada, and the United States midwest, the establishment of a plant in Saskatchewan appears unlikely in the immediate future. With a

growing demand for chemicals and plastics in Saskatchewan and the other Prairie Provinces by manufacturing industries, agriculture, and domestic consumers, the long-run prospects for a plant appear reasonable. The most likely development is an ammonia plant oriented to the provincial market primarily in nitrogen fertilizers.

Coal. Minable reserves of coal are estimated to be 3.5 billion tons at Estevan, 2.7 billion at Willowbunch, and 0.3 billion in the Cypress Hills area. The competitive position of Saskatchewan's lignite coal is limited by the caloric content, 7,000 Btu per pound compared with 8,900 Btu per pound of Alberta bituminous. The possible development of the province's iron-ore deposits may open up a potential use of lignite in processing the ore. The prospects for producing other forms of fuel or chemicals from lignite appear poor because of the low coal-tar content.

Labor

There is an abundance of labor in Saskatchewan, and due to the high degree of motorization, particularly in rural areas, plants locating in relatively isolated areas (for proximity to raw materials) can expect to draw a substantial labor force from the surrounding area. In addition to supply, labor management relations are good, and the Department of Labor is very active in the field of conciliation. In some industries where labor organization and collective bargaining are not well developed, higher labor standards such as the additional vacation time required by Saskatchewan law may put local employers at a disadvantage relative to those in Alberta and Manitoba with respect to the total wage bill. Also, on average, wages tend to be lower in Manitoba than in the other Prairie Provinces.

Government and Business Climate

Observations and analysis during the extensive field work in Saskatchewan indicate that there is a favorable public and official attitude toward industry. This conclusion is substantiated by the achievements and prosperity of various new and established enterprises which constitute Saskatchewan's growing industrial complex.

The importance of diversification of the economy has long been recognized, as evidenced by government encouragement given to the industrial sector. The provincial government's policy to promote industrial

growth is implemented primarily through three agencies: (1) the Industrial Development Office, which provides research, information, liaison, and other services incident to the needs of prospective entrepreneurs; (2) the Industrial Development Fund, which provides long-term loans at low rates of interest; and (3) the Saskatchewan Research Council, which deals with technical problems of local industry and undertakes research on behalf of individual firms in the province.

The administration of mineral and other natural resources is highly developed, and includes such programs as the building of access roads, assistance to prospectors, a variety of geological surveys and services, forest inventories, research, fire control, the filing and correlation of technical data, and conservation policy to prevent waste.

Since 1944 the province has been administered by the Co-operative Commonwealth Federation, a political party popularly described as socialist. Largely because of experience in the economic background of Saskatchewan during the 1930's, the Saskatchewan government has gone further than other provincial governments in aid to cooperatives and in the creation of publicly owned corporations. In addition to transportation and utilities, which often come under the control of provincial governments, the Saskatchewan government has been active in the exploration of natural resources and the operation of certain associated industries, notably, sodium sulphate, clay, and timber products. Also, the government operates in the field of insurance and the marketing of fish and fur. The Fish Marketing Service has recently been transferred to a cooperatively owned enterprise. Since the upswing in the provincial economy in the early 1950's, the government has made no move to establish new industries or services.

In the past a negative factor in the business environment has been the unattractive appearance of some towns in the province, and not infrequently a lack of concern at the municipal government level for industrial growth. In recent years notable improvements have been effected, and interest at the community level has been awakened. The detailed suggestions given in Section IX are aimed particularly at channeling this interest toward effective accomplishments.

Markets

Markets for resource-based industries lie almost entirely outside Saskatchewan and, in many instances, outside Canada. The major industries in the province will continue to be the primary industries--those based on the development of the natural resources, particularly

agriculture, minerals, and forests, and oriented to the North American and world-wide market. Closely allied to these industries are the secondary and service industries serving the needs and requirements of the primary industries and of the people employed therein. These are the industries oriented to the local market and include elements of manufacturing, service, and retail and wholesale trade. As the economy grows, there will be increasing opportunities for other industries. Accordingly, an industry deemed not feasible today may well be feasible tomorrow because of the expanding market. The growth of the Saskatchewan market has provided many opportunities in trades and services. For instance, when the population of Regina numbered 50,000, a certain number of stores, service stations, barber shops, and so forth, were in business in the city. At the time Regina reaches a population of 100,000, this number of business establishments might well be doubled, except to the extent that part of the increased volume is assimilated by the original establishments. This proportional analysis is an oversimplification, but the effects described are those realized in growth economies such as that of Saskatchewan. A steady growth is expected to continue in the Saskatchewan market, with population estimated to increase by about 40 to 65 percent between 1958 and 1981. The population of the Prairie market, in which Saskatchewan is centrally located, has increased by 20 percent from 1950 to 1958, and is expected to increase an additional 40 to 70 percent from 1958 to 1981.

Various techniques were employed in this study which resulted in the development of several lists of possible opportunities for the establishment of industries oriented to the Prairie market. These extensive lists are presented in tables in the body of the report. Although these lists are meant only to suggest the types of opportunities, they are helpful in identifying the industry areas most logical for further analysis. Many of the major gaps in production in Saskatchewan have been filled, particularly in recent years. Much of what is left includes a multitude of smaller opportunities. The following is a partial list of products that could be produced and marketed in the province: rubber goods; cordage, rope, and twine; aluminum products; asbestos cement products; electrical apparatus and supplies; soap and cleaning preparations; paints; and small leather goods.

Transportation

The dispersion of population throughout the Prairie region creates an important distribution problem for market-oriented industries. With the trend toward concentration of population and industry in the largest urban centers, this problem should diminish slightly in the future. In

addition, transportation is a problem for export industries. Transportation to and from the ports and large population and manufacturing centers of North America has been a major factor retarding development of the Canadian Prairies. The distances involved in reaching export markets and the exclusive dependence on rail have put Saskatchewan export industries at a competitive disadvantage. The same factor has also operated to the province's disadvantage in obtaining production machinery and materials from manufacturing centers.

Good local transportation facilities are available. All major centers in the province are connected by paved highways. There is also a highly developed rail network and good air services to large towns in southern Saskatchewan; the tourist and mining areas in the north are served by four airlines.

Other Location Factors

Industrial fuel and power are readily available. The province is well situated to supply low cost fuel oil and natural gas either from local wells and refineries, or from border areas in Alberta. Generation of electric power is under the control of the Saskatchewan Power Corporation, which is prepared to negotiate rates with large users in its distribution area to supply power at or near cost.

Living conditions in most Saskatchewan communities are good. Several of the larger cities have well-developed programs for urban development. The province has excellent health services and educational facilities, and there is abundant opportunity for recreation, particularly in the northern region. Some hold the opinion that climate makes Saskatchewan a comparatively undesirable place in which to live, but many local residents think this largely stems from lack of knowledge about the province by people from outside, and express the opposite opinion. The winter climate is certainly unfavorable, but no more so than many areas of North America which have experienced considerable industrialization.

Prospects for Growth

In this decade the tempo of industrial and resource development in Saskatchewan has increased at an accelerating rate; this situation is expected to continue. The province faces a future in which diverse types of industry will continue to bring new buoyancy and stability to the economy. The rich endowments of natural resources and, to a much

lesser extent, the location of the province in the center of the Prairie market, are fundamental to continued economic growth and development.

The principal growth is expected to take place in mining and manufacturing, while there will be an associated expansion of the construction and service industries. Nonagricultural industries currently account for 60 percent of the province's net value of output and by 1981 are expected to total 70 to 75 percent. Although the rate of growth in these sectors is expected to be greater than that of agriculture, the long-run prospects for agriculture should not be minimized. The present surplus position in various agricultural products may be deemed to be temporary. In the longer run the increasing pressure of world population on available food resources will provide a renewed stimulus to Saskatchewan agricultural production.

It is expected that by 1981 the population of Saskatchewan will increase to between 1,170,000 and 1,480,000. It is also expected during this period that rural population will decline by 15 to 20 percent. This means an urban population in the province of between 700,000 and 1,040,000 by 1981, a 115 to 235 percent increase over the 1956 figures.

In addition to population increases, it is also expected that there will be higher per capita real income as a result of higher productivity arising from technology. Such changes in productivity vary with region and industry. However, a figure of 1 percent per year seems reasonable for the Prairie region. If this figure is assumed, then total purchasing power in Saskatchewan may be expected to increase from $1.27 billion in 1958 to between $2.04 billion and $2.57 billion by 1981, a total increase of 60 to 100 percent.

Both the government and communities of Saskatchewan have an important role to play in achieving the levels projected. In the fields of minerals it is important that the government accelerate the geologic mapping program. Action leading to the preservation of data derived from groups involved in exploration would eliminate much unnecessary duplication of effort. The northern road program currently under way will also be an important factor in mineral development. The Industrial Development Fund could consider extending loans to industries for working capital as well as for fixed assets, and, in addition, could consider granting financial assistance to private and municipal development corporations.

At the community level, local industrial development agencies could consider preparation of concise accurate data on what their district has

to offer a prospective industry. The ready availability of such data is important in interesting potential industry in a particular community.

Local agencies could investigate the feasibility of getting local enterprise to undertake the establishment of a new industry or expansion of an existing one, as well as looking into the feasibility of establishing development corporations, either under municipal or private auspices.

It would increase the efficiency of government agencies in fostering industrial development if a centralized statistics section were established to handle the collection, analysis, and publication of statistics, particularly those relating to industry and commerce. This might lead to a reduction of total staff and better quality of data on a continuing basis. Along the same lines, the government might give consideration to the formation of a department of industry and commerce. Such a department could consolidate the activities of a number of government agencies which currently are directed to various aspects of industrial development, but which have no formal coordination.

The government might also investigate the possibility of establishing a productivity agency (possibly within the framework of a department of industry and commerce) designed to assist Saskatchewan industry in management, organizational, and engineering aspects of increasing production efficiency.

Section III

GROWTH OF THE SASKATCHEWAN ECONOMY



Combines on the Saskatchewan Prairie

SASK. GOVT. PHOTO

Section III

GROWTH OF THE SASKATCHEWAN ECONOMY

General Review

The province of Saskatchewan was established in 1905, and during the course of its 54 years of history has been one of the most prosperous and at other times one of the most depressed provinces in Canada. The history of the province's development may be divided into three periods. The first was a quarter century of dynamic growth as migrants flowed in to develop the wheat economy, which came to an end in 1930. The second period began in 1930 with the onset of the depression; immigration was reduced to a trickle and farm prices tumbled. In addition to depressed economic conditions, Saskatchewan also suffered from drought and pests--1930 was the first of eight bleak years of below-average crops. For the next 14 years the Saskatchewan economy floundered, first as farm net income sank to less than zero and secondly as the war years accelerated the growing exodus of people from the province. The third period began at the close of the war. In the ensuing 14 years, the provincial economy has been characterized by growth. Contrary to the period prior to 1930, this new era of growth is based primarily on the development of resources other than agriculture. The attendant diversification of economic activity has created and continues to create new opportunities for industrial development.

This section is devoted to an analysis of these changing patterns of economic growth.

Indicators of Economic Growth

Population, production, and income are some of the principal measures of growth, and Saskatchewan has shown violent extremes in all three categories.

Population

In the first 25 years of the province, under the impact of a heavy tide of immigration, the provincial population increased approximately fourfold, growing more rapidly than any other Canadian province except Alberta. In 1931, immigrant arrivals in Saskatchewan dwindled to less than a

thousand and this rapid population growth came to an abrupt halt. For the next five years, the natural increase in the province just balanced the number of people who left for other parts of Canada. After 1936, population declined sharply for the next decade as almost a quarter of a million people left the province for a net reduction of 100,000 people. A period of stability prevailed from 1945 to 1951. Since then a new period of growth has emerged; population is again approaching the 1936 level (see Tables 1 and 2), although the rate of population growth is still below the national average.

The movement of population has not been a simple one. For instance, the loss of population during the 1936-46 period was primarily a result of the movement of people from the farms to urban areas. Saskatchewan urban areas did not provide the necessary employment opportunities, so the movement went to cities in other parts of Canada. During this period the urban population in Saskatchewan showed some slight upward movement (Table 3), but it was not until 1946 that the growth of Saskatchewan urban areas began to reflect fully the national trend.

Since 1946, although the farm population has continued to decline, the growth of the province's urban population has more than counterbalanced it. Saskatchewan's farm population declined from 574,000 in 1936 to 362,000 in 1956; urban population has risen from 208,872 in 1936 to 323,003 in 1956.

The decline in farm population has not been a result of any decrease in the area under cultivation. (As a matter of fact, the area in farms and in improved land has increased steadily throughout the period--see Table 4.) Nor has there been an accompanying drop in farm production. The decrease in farm population has been a cause as well as an effect of the substitution of machines for men. The increasing use of mechanical equipment on the farm has made it possible for one man to farm an ever larger acreage, and increasing opportunities in industries other than agriculture have drawn people away from farms. Perhaps mechanization has been forced as much by the scarcity or high cost of labor as by its importance as an efficiency measure. In short, the farm population has felt the pull of the cities' wage levels as well as the push of technology.

The implications of population growth and change for general economic development are clear. The growth in population implies growing markets for a wide range of consumer goods and services. Many service industries--manufacturing, construction, transportation, and others--have reflected the impact of this growing demand. The continuing shift of population to the urban centers has created special demands for the

Table 1

POPULATION OF SASKATCHEWAN
1921-1959

Year	Saskatchewan (thousands)	Canada[1/] (thousands)	Saskatchewan as Percent of Canada[1/]	Saskatchewan as Percent of Canada[2/]
1921	757	8,788	8.6%	%
1922	769	8,919	8.6	
1923	778	9,010	8.6	
1924	791	9,143	8.6	
1925	806	9,294	8.7	
1926	821	9,451	8.7	
1927	841	9,637	8.7	
1928	862	9,835	8.8	
1929	883	10,029	8.8	
1930	903	10,208	8.8	
1931	922	10,376	8.9	
1932	924	10,510	8.8	
1933	926	10,633	8.7	
1934	928	10,741	8.6	
1935	930	10,845	8.6	
1936	931	10,950	8.5	
1937	922	11,045	8.3	
1938	914	11,152	8.2	
1939	906	11,267	8.0	
1940	900	11,381	7.9	
1941	896	11,507	7.8	
1942	848	11,654	7.3	
1943	838	11,795	7.1	
1944	836	11,946	7.0	
1945	833	12,072	6.9	
1946	833	12,292	6.8	
1947	836	12,551	6.7	
1948	838	12,823	6.5	
1949	832	13,447	6.2	6.4
1950	833	13,712	6.1	6.2
1951	832	14,009	5.9	6.1
1952	843	14,459	5.8	6.0
1953	861	14,845	5.8	6.0
1954	873	15,287	5.7	5.9
1955	878	15,698	5.6	5.7
1956	881	16,081	5.5	5.6
1957	879	16,589	5.3	5.4
1958	888	17,048	5.2	5.3
1959	902	17,442	5.2	5.3

1/ Newfoundland included from 1949 on.
2/ Less Newfoundland.

Sources: "Population of Canada by Provinces: Estimated for Inter-censal Years," D.B.S. Percentage computations by ERC.

Table 2

POPULATION MOVEMENTS
1916-1956

Year	Total Population (thousands)	Natural Increase	Saskatchewan Immigration[1/]		Saskatchewan Emigration	Net Change
			Number of Arrivals	As a Percent of Canadian Totals		
1916	648.0	14,182	9,507	14.6%	--	--
1921	757.0	16,810	9,426	11.4	--	--
1926	821.0	14,656	20,085	13.9	14,741	+20,000
1927	841.0	14,984	15,331	10.1	9,315	+21,000
1928	862.0	15,095	14,789	8.8	8,884	+21,000
1929	883.0	14,731	11,003	6.7	5,734	+20,000
1930	903.0	15,742	5,057	5.7	2,799	+18,000
1931	922.0	15,265	1,177	4.6	14,442	+ 2,000
1932	924.0	14,770	955	4.8	13,725	+ 2,000
1933	926.0	14,121	690	5.0	12,811	+ 2,000
1934	928.0	13,840	493	4.1	12,333	+ 2,000
1935	930.0	13,443	414	3.7	12,357	+ 1,500
1936	931.5	12,811	525	4.4	22,836	- 9,500
1937	922.0	11,715	618	4.0	20,333	- 8,000
1938	914.0	12,151	675	3.9	20,826	- 8,000
1939	906.0	12,028	1,214	7.5	19,242	- 6,000
1940	900.0	12,845	241	2.1	17,086	- 4,000
1941	896.0	12,006	170	1.9	60,176	-48,000
1942	848.0	11,999	123	1.7	22,122	-10,000
1943	838.0	11,850	188	2.1	14,038	- 2,000
1944	836.0	11,684	630	4.1	15,314	- 3,000
1945	833.0	12,497	1,581	5.1	14,378	- 300
1946	832.7	15,011	4,241	6.3	15,952	+ 3,300
1947	836.0	16,724	2,250	2.8	16.974	+ 2,000
1948	838.0	15,066	5,372	4.3	26,438	- 6,000
1949	832.0	15,066	3,301	3.8	17,367	+ 1,000
1950	833.0	15,303	3,078	3.6	19,681	- 1,300
1951	831.7	15,293	4,336	2.1	8,329	+11,300
1952	843.0	15,980	3,642	2.5	1,622	+18,000
1953	861.0	17,016	3,654	2.1	8,670	+12,000
1954	873.0	18,658	4,015	2.8	17,673	+ 5,000
1955	878.0	18,085	2,532	2.3	17,917	+ 2,700
1956	880.7	17,393	2,869	1.4	21,962	- 1,700

1/ Data available for Dominion fiscal year ending March 31.

Sources: Annual Report of the Dept. of Agriculture of Saskatchewan, 1940-1950. Saskatchewan Vital Statistics, Dept. of Public Health of Saskatchewan, 1956.

Table 3

DISTRIBUTION OF POPULATION
IN SASKATCHEWAN
1901-1956

Year	Total	Urban		Rural		Farm	
		Total	Per-cent	Total	Per-cent	Total	Per-cent
1901	91,279	5,592	6.1%	85,687	93.9%	n.a.	n.a.%
1911	492,432	79,502	16.1	412,930	83.9	n.a.	n.a.
1921	757,510	127,622	16.8	629,888	83.2	n.a.	n.a.
1931	921,785	187,121	20.3	734,664	79.7	564,012	61.2
1936	931,547	178,543	19.2	753,004	80.8	573,894	61.6
1941	895,992	190,738	21.3	705,254	78.7	514,677	57.4
1946	832,688	208,872	25.1	623,816	74.9	434,019	52.1
1951	831,728	252,470	30.3	579,258	69.7	399,473	48.0
1956	880,665	322,003	36.6	558,662	63.4	362,231	41.1

n.a. = not available.

Note: All centers of a population with 1,000 people and more were classified as urban, all others as rural.

Sources: Census of Canada, D.B.S. Census of the Prairie Provinces, D.B.S.

Table 4

POPULATION, FARMS, AND LAND AREAS IN SASKATCHEWAN
1921-1956

Year	Population			Total No. of Farms[1]	Land							
	Total	Farm	Farm as a Percent of Total		Total Land Area[2] (acres)	Area in Farms (acres)	Area in Farms as Percent of Total	Average Area per Farm (acres)	Improved Land (acres)	Improved Land as Percent of Area in Farms	Unimproved Land (acres)	Unimproved Land as Percent of Area in Farms
1921	757,510	n.a.	—%	119,451[3]	140,916,480	44,022,907[4]	31.2%	368.5	25,037,401	56.9%	18,985,506	43.1%
1926	820,738	n.a.	--	117,781[3]	140,916,480	45,945,410[4]	32.6	390.1	27,714,490	60.3	18,230,920	39.7
1931	921,785	564,012	61.2	136,472	140,916,460	55,673,460	39.5	407.9	33,548,988	60.3	22,124,472	39.7
1936	931,547	573,894	61.6	142,391	140,916,480	56,903,639	40.4	399.6	33,631,608	59.1	23,272,031	40.9
1941	895,992	514,677	57.4	138,713	140,916,480	59,960,927	42.6	432.3	35,577,320	59.3	24,383,607	40.7
1946	832,688	434,019	52.1	125,612	140,916,480	59,416,127	42.2	473.0	35,590,239	59.9	23,825,888	40.1
1951	831,728	399,473	48.0	112,018	140,916,480	61,663,195	43.8	550.5	38,806,770	62.9	22,856,425	37.1
1956	880,665	362,231	41.1	103,391	140,916,480	62,793,979	44.6	607.3	40,506,000	64.5	22,287,979	35.5

1/ Data before 1941 are not strictly comparable owing to differences in definition.
2/ The land area total has been revised since 1951 census.
3/ Farms on Indian reserves are not included.
4/ Area includes only improved acreage on Indian reserves.

Sources: Census of Canada, 1956, D.B.S., Bulletin: 2-8, Table 1. Census of the Prarie Provinces, 1946, D.B.S., Volume IV, Table 1, page 240.

construction industry. Finally, the growing technological base of provincial agriculture has resulted in a flourishing trade and service industry to supply and maintain the wide variety of machinery and equipment required. Familiar multiplier effects are present in all cases.

Personal Income

A better measure of economic growth than population is the level of personal income. A distinguishing characteristic of personal income in Saskatchewan is its range of fluctuation. For instance, although in the last ten years (1949-58) per capita personal income for Saskatchewan averaged only 3 percent below the national average, it varied from 19 percent above in 1952 to 26 percent below the national average only two years later (see Table 5). This degree of variation has been the historical pattern as well. Average per capita personal income for the period 1926-1928 was higher in Saskatchewan than for the nation as a whole, but for the period 1929 to 1941 slumped much below the Canadian average. In only one year during the entire period 1929-1941 did per capita personal income in the province climb up to even three-quarters of the national figures; during three years it fell to less than half. Then in 1942 Saskatchewan's per capita personal income more than doubled, and was again above the national average, a position which it achieved in six of the sixteen following years.

The variability of Saskatchewan income is rooted in its dependence on agriculture and particularly, as will be indicated later, on one staple crop, wheat. For instance, it was the collapse of farm income that kept personal income in Saskatchewan at such a low level in the 30's; indeed net farm income in five of those years was less than zero. Moreover, it was the phenomenal quadrupling of farm net income sparked by high yields and a recovery in wheat prices that brought the province's per capita income above the national average in 1942. Since that time, fluctuations in net farm income have accounted for practically all the fluctuations in the total figures (Table 6). Figure 1 graphically demonstrates this correlation. However, the short-term effect of the above fluctuations is now relieved by the greater degree of stability of farm cash income based on carry-over of stored grain.

A factor emerging in the Saskatchewan income picture is the increasing relative importance of wage and salary income, reflecting the expansion in nonfarm activity. The total of wages and salaries has shown a remarkably steady increase since 1938, but it was not until 1944 that total wages and salaries exceeded predepression levels and not until 1954 that this total exceeded net farm income. In both 1957 and 1958,

Table 5

PER CAPITA PERSONAL INCOME
IN CANADA AND SASKATCHEWAN
1926-1957

Year	Canada	Saskatchewan	Year	Canada	Saskatchewan
1926	$425	$435	1943	$ 682	$ 511
1927	439	446	1944	742	786
1928	463	465	1945	755	637
1929	459	307	1946	791	770
1930	425	260	1947	827	758
1931	348	155	1948	928	927
1932	287	158	1949	940	957
1933	262	124	1950	979	849
1934	292	153	1951	1,130	1,329
1935	309	195	1952	1,203	1,434
1936	324	189	1953	1,235	1,319
1937	363	161	1954	1,205	927
1938	365	216	1955	1,257	1,164
1939	381	294	1956	1,361	1,392
1940	432	307	1957	1,388	1,146
1941	508	304	1958	1,431	1,245
1942	634	640			

Source: National Accounts, Income and Expenditure, D.B.S., Research and Development Division.

Table 6

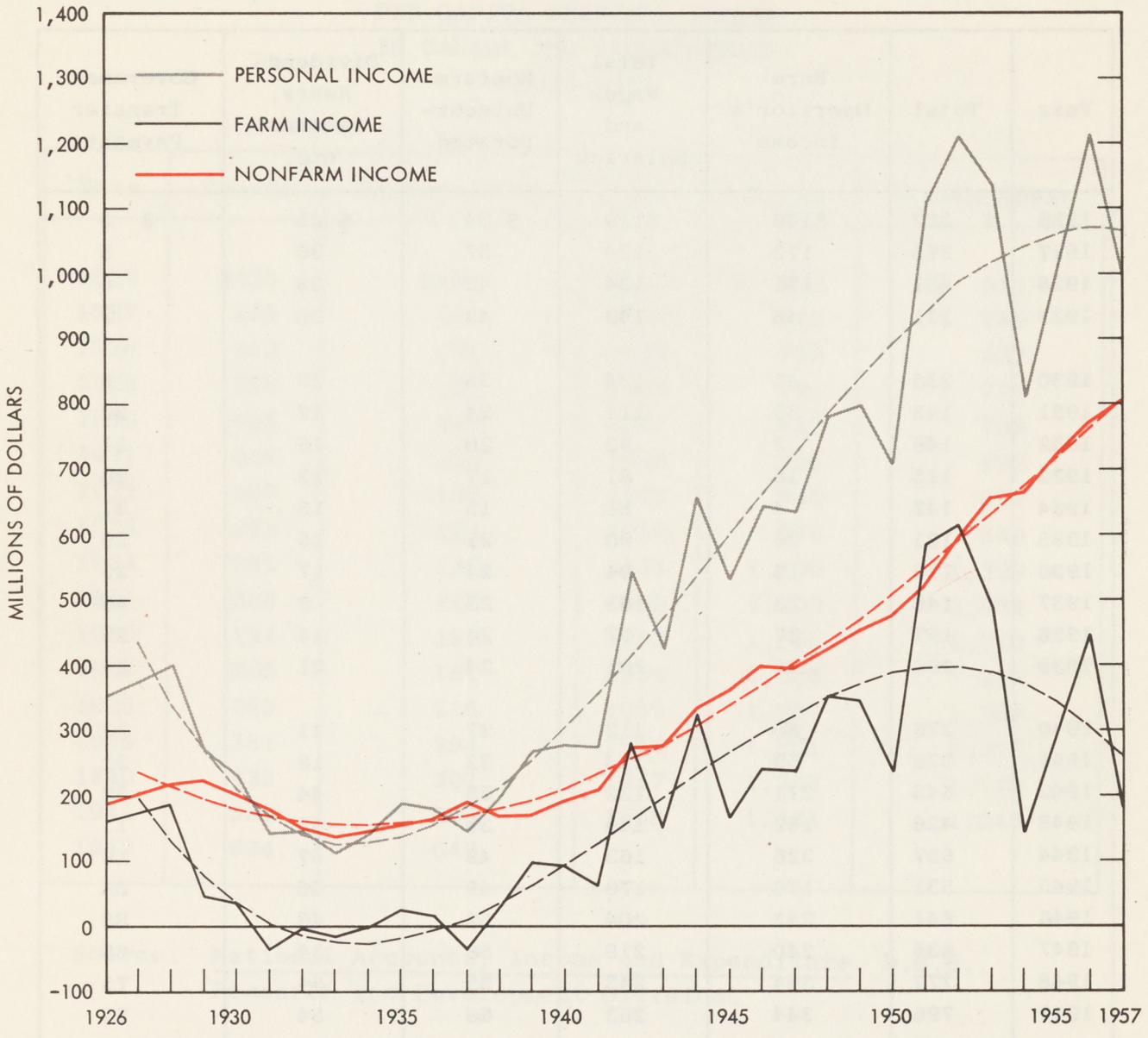
SOURCES OF PERSONAL INCOME IN SASKATCHEWAN
1926-1958
(Millions of Dollars)

Year	Total	Farm Operator's Income	Total Wages and Salaries	Nonfarm Unincorporated	Dividends, Rents, Interest, etc.	Government Transfer Payments
1926	$ 357	$166	$119	$ 34	$ 33	$ 5
1927	375	173	124	37	36	5
1928	401	181	134	42	38	6
1929	271	48	143	43	30	7
1930	235	35	134	35	23	9
1931	143	33	114	24	17	22
1932	146	3	92	20	16	21
1933	115	16	81	17	13	20
1934	142	4	86	15	15	31
1935	181	26	90	21	15	29
1936	176	15	94	24	17	26
1937	148	38	103	25	9	48
1938	197	27	97	24	14	35
1939	266	95	101	24	21	24
1940	276	86	112	27	21	23
1941	272	59	124	32	18	21
1942	543	271	132	36	44	32
1943	428	152	144	39	42	11
1944	657	326	163	43	57	19
1945	531	170	176	49	45	38
1946	641	242	204	52	46	88
1947	634	240	219	56	54	68
1948	777	354	243	55	54	75
1949	796	344	263	66	54	74
1950	707	235	278	67	62	70
1951	1,106	582	315	73	73	70
1952	1,209	614	350	80	88	85
1953	1,136	484	411	91	73	85
1954	809	145	439	86	54	93
1955	1,022	296	445	89	86	121
1956	1,226	443	499	104	94	105
1957	1,007	174	534	113	97	120
1958	1,106	182	566	118	103	174

Source: National Accounts, Income and Expenditure, D.B.S.

FIG. 1

PERSONAL INCOME IN SASKATCHEWAN
1926 - 1957



SOURCE: Dominion Bureau of Statistics.

wages and salaries were more than three times as large as net farm income.

The continued growth in nonfarm income has contributed a new stability to the provincial economy. A measure of this stability is the fact that while net farm income dropped by 60 percent in 1957, the total personal income in Saskatchewan dropped by only 18 percent.

The growth and change in personal incomes is indicative of the nature of the continuing economic development of the province. Standards of material welfare have improved substantially in recent years. Diversified growth has increased the relative importance of nonfarm income and contributed toward stability in purchasing power.

Diversification in Production

The changes in industrial structure accompanying population and income growth indicate the recent trend toward diversification and stability of economic development in the province of Saskatchewan.

It has been noted that an increasing share of income has been originating in sectors of the economy other than agriculture. In an economy like that of Saskatchewan, two types of diversification are possible, at least theoretically. The first is diversification through the establishment or expansion of the nonagricultural industries. The second is diversification within agriculture, to shift away from wheat and grains to other crops and livestock.

Diversification through Expansion of Nonagricultural Industries

Various ways can be devised to gauge diversification in nonagricultural industries. The relative importance of particular industries in an economy can be measured by investigating the returns which accrue from the various industries (output), or the value of the goods and materials which are devoted to them (input).

Output of Nonagricultural Industries. Tables 7 and 8 show the returns which accrue from the various industries in Saskatchewan.

In the last ten years (1948-58) mining production has almost quadrupled in value, while that of the construction industry has tripled.

Table 7

NET VALUE OF COMMODITY PRODUCTION
IN SASKATCHEWAN, BY INDUSTRY
1948-1958
(Millions of Dollars)

Industry	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
Forestry	$ 3.9	$ 2.4	$ 3.6	$ 4.5	$ 3.7	$ 3.6	$ 4.5	$ 4.2	$ 5.1	$ 3.9	$ 4.2
Fisheries	0.5	0.5	0.7	0.9	0.7	0.6	0.7	0.8	0.8	0.9	1.0
Trapping	2.3	2.0	2.0	2.0	1.7	2.1	1.4	3.7	2.8	2.1	2.1
Subtotal	$ 6.7	$ 4.9	$ 6.3	$ 7.4	$ 6.1	$ 6.3	$ 6.6	$ 8.7	$ 8.7	$ 6.9	$ 7.3
Mining	44.9	31.9	26.9	38.7	29.7	32.9	35.6	45.4	76.5	127.9	164.0
Electric Power	8.2	8.9	10.0	11.1	12.8	14.6	17.0	18.6	21.6	23.7	26.3
Manufacturing	45.1	47.4	49.5	61.1	80.9	79.9	104.6	113.6	113.6	110.0	125.0
Construction	66.8	66.4	63.6	72.9	93.5	125.3	170.6	150.6	199.4	202.7	205.4
Agriculture	421.0	376.5	479.8	685.3	796.1	652.9	235.9	500.9	611.7	284.7	315.6
Total	$592.7	$536.0	$636.1	$876.5	$1,019.1	$911.9	$570.3	$837.8	$1,031.5	$755.9	$843.6

Sources: Survey of Production, 1926-1956 and 1957-1958, D.B.S. Government of Saskatchewan, Economic Advisory and Planning Board estimates.

Table 8

PERCENTAGE DISTRIBUTION OF NET VALUE OF COMMODITY PRODUCTION
IN SASKATCHEWAN, BY IN INDUSTRY
1948-1958

Industry	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
Forestry	0.7%	0.4%	0.6%	0.5%	0.4%	0.4%	0.8%	0.5%	0.5%	0.5%	0.5%
Fisheries	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Trapping	0.4	0.4	0.3	0.2	0.2	0.2	0.3	0.5	0.3	0.3	0.2
Subtotal	1.1%	0.9%	1.0%	0.8%	0.7%	0.7%	1.2%	1.1%	0.9%	0.9%	0.9%
Mining	7.6	6.0	4.2	4.4	2.9	3.6	6.2	5.4	7.4	16.7	19.4
Electric Power	1.4	1.7	1.6	1.3	1.2	1.6	3.0	2.2	2.1	3.1	3.1
Manufacturing	7.6	8.8	7.8	7.0	7.9	8.8	18.3	13.5	11.0	15.6	14.8
Construction	11.3	12.4	10.0	8.3	9.2	13.7	29.9	18.0	19.3	26.5	24.3
Agriculture	71.0	70.3	75.4	78.2	78.1	71.6	41.4	59.8	59.3	37.2	37.4
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Sources: Survey of Production, 1926-1956, and 1957-1958, D.B.S. Government of Saskatchewan, Economic Advisory and Planning Board estimates.

The net value contributed by the manufacturing sector has increased by more than two and one-half times (see Table 7). At the same time, the net value of agricultural production declined by almost 25 percent.

Of particular significance is the fact that most of the development in the nonfarm sector has taken place in the last five years, while the upsurge in the value of mining production has taken place since 1955 as a result of increased oil production. Thus there is a rather sharp break between the period 1949-53, when three-quarters of total commodity production originated in agriculture, and the period 1954-58, when agricultural production contributed less than half of the total (see Table 8). It is true that the low levels of agricultural production, particularly in the last two years, result mainly from lower grain yields, but the sustained upward trend of nonfarm production indicates that a fundamental transformation of the Saskatchewan economy is taking place.

Figure 2 shows the proportion of the net value of production which has been created by five categories of industry. Again, despite the year-to-year fluctuations, the trend seems clear.

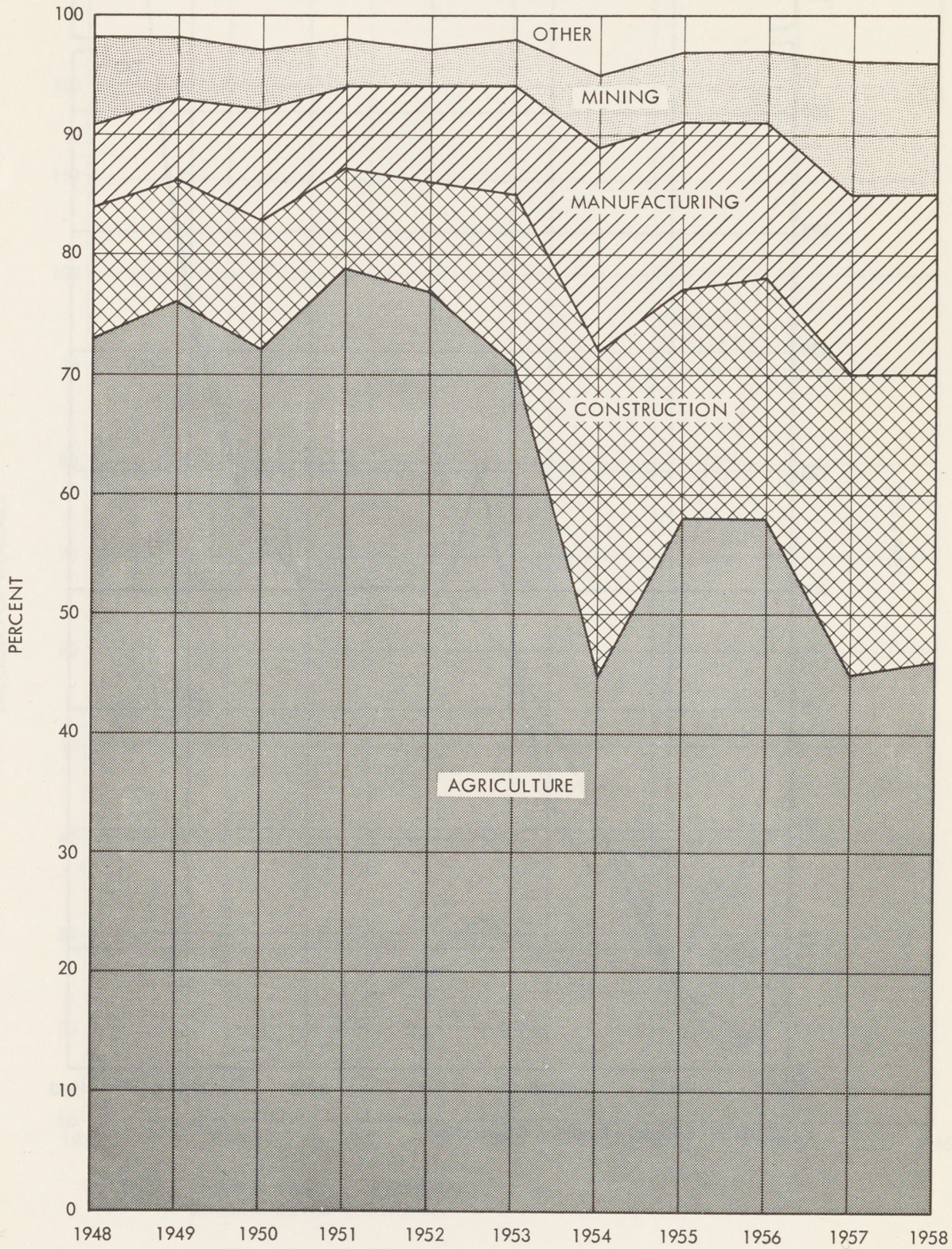
A graphic indication of the rate of growth of mineral production in the province is given in Figure 3. The changes in net value of output of all manufacturing and of individual manufacturing industries are shown in Figures 4 through 16.

In spite of the growth of the nonfarm sector, agriculture is still Saskatchewan's most important single industry (Figure 17). Even with the low production levels of 1958, it ranked 50 percent higher than its nearest competitor, the construction industry (Figure 18). Agriculture will probably never regain its position of overwhelming dominance, but it will continue to be of extreme importance to the provincial economy. This is indicated by the fact that the physical volume of agricultural production has been increasing in spite of the decline in farm population.

The level of agricultural production is likely to continue to increase with improved technology, although in the Prairie Provinces climatic conditions have a more profound effect on production than in most agricultural regions, and thus temper the influence of technology.

FIG. 2

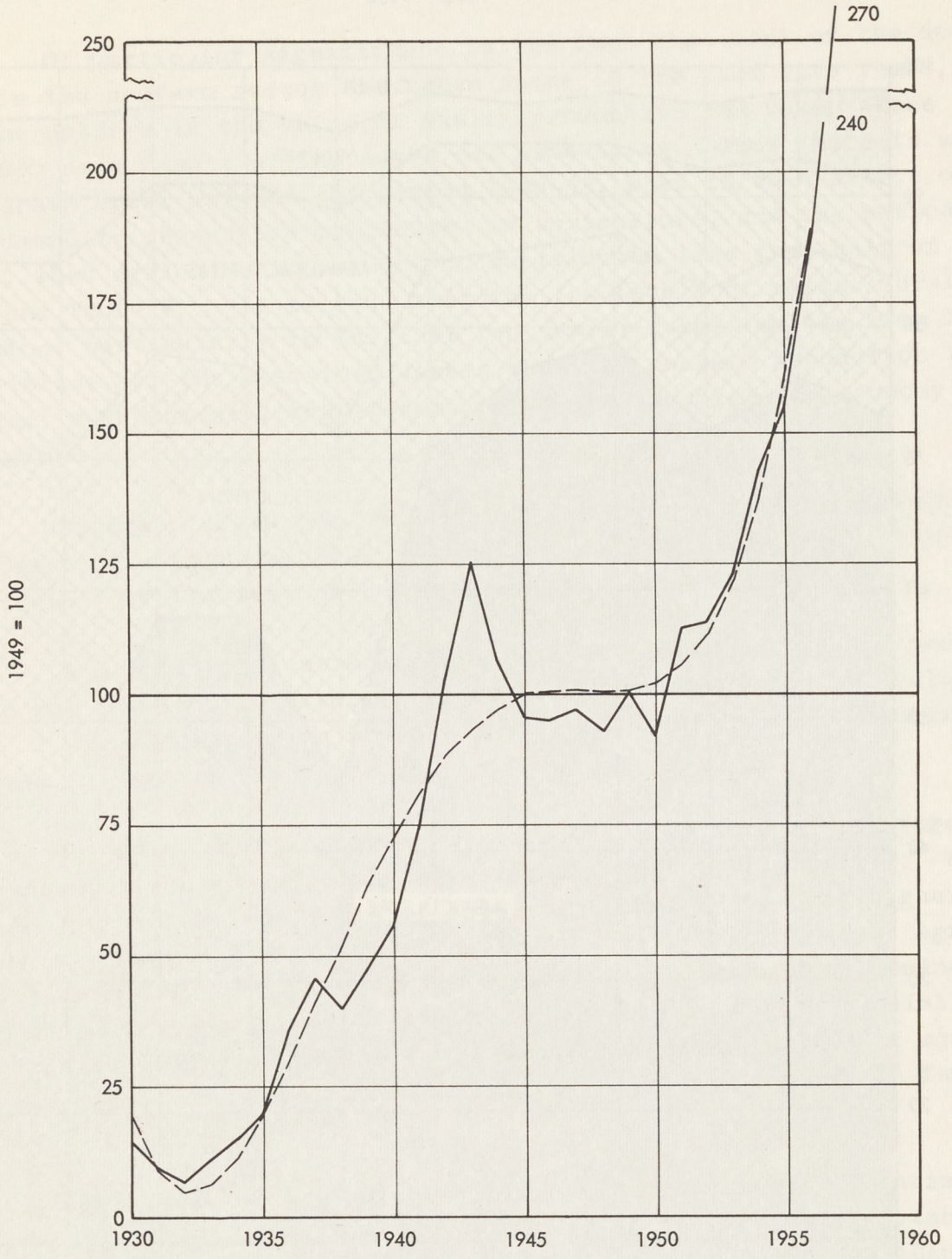
PERCENT DISTRIBUTION OF TOTAL NET VALUE OF PRODUCTION
OF MAJOR INDUSTRIES IN SASKATCHEWAN
1948 - 1958



SOURCE: Dominion Bureau of Statistics.

FIG. 3

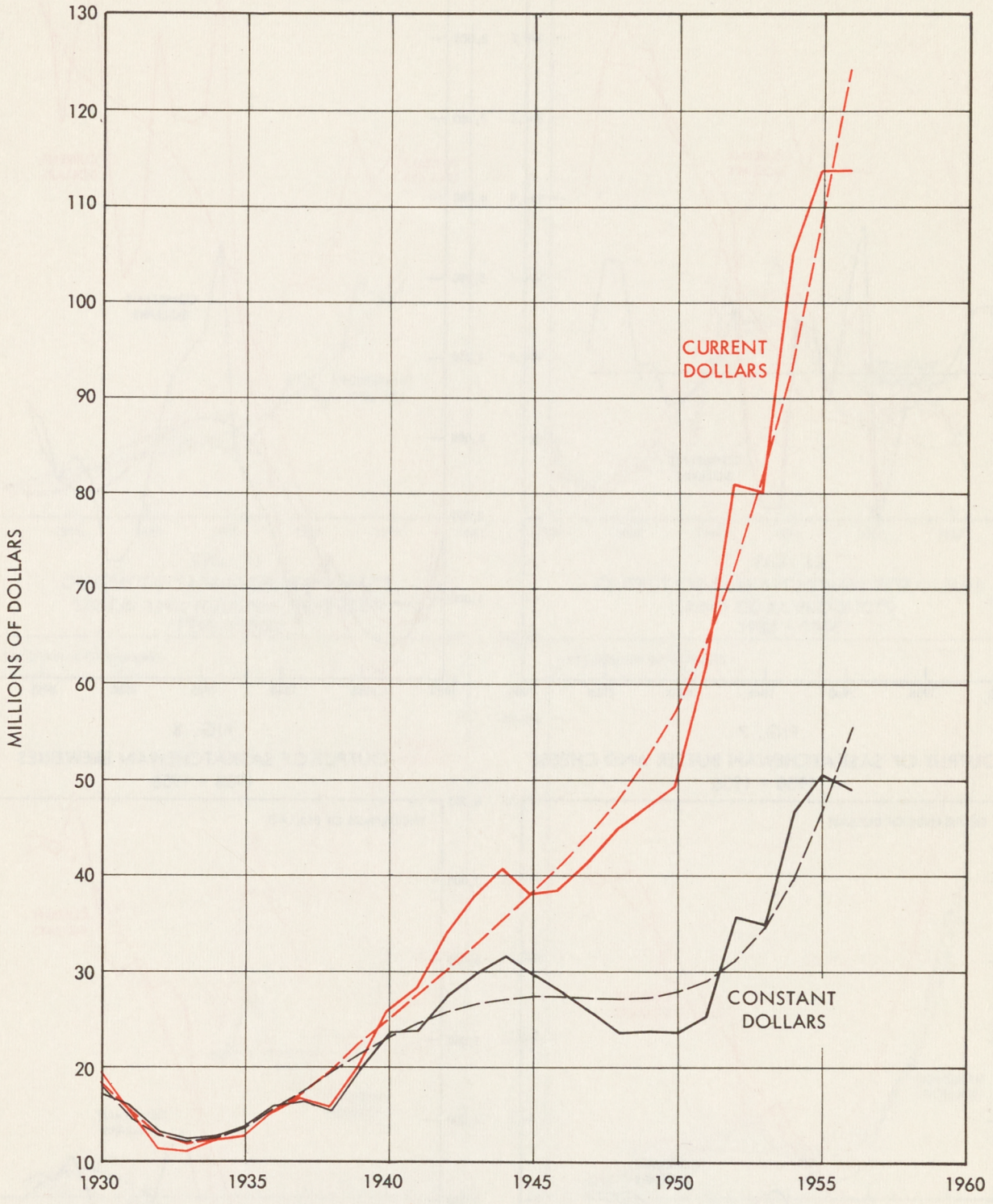
INDEX OF MINERAL PRODUCTION IN SASKATCHEWAN
1930 - 1957



SOURCE: Economic Research Corporation.

FIG. 4

TOTAL NET VALUE OF MANUFACTURING IN SASKATCHEWAN
1930 - 1956



SOURCES: Economic Research Corporation.
Dominion Bureau of Statistics.

FIG. 5

OUTPUT OF SASKATCHEWAN FLOUR MILLS
1930 - 1956

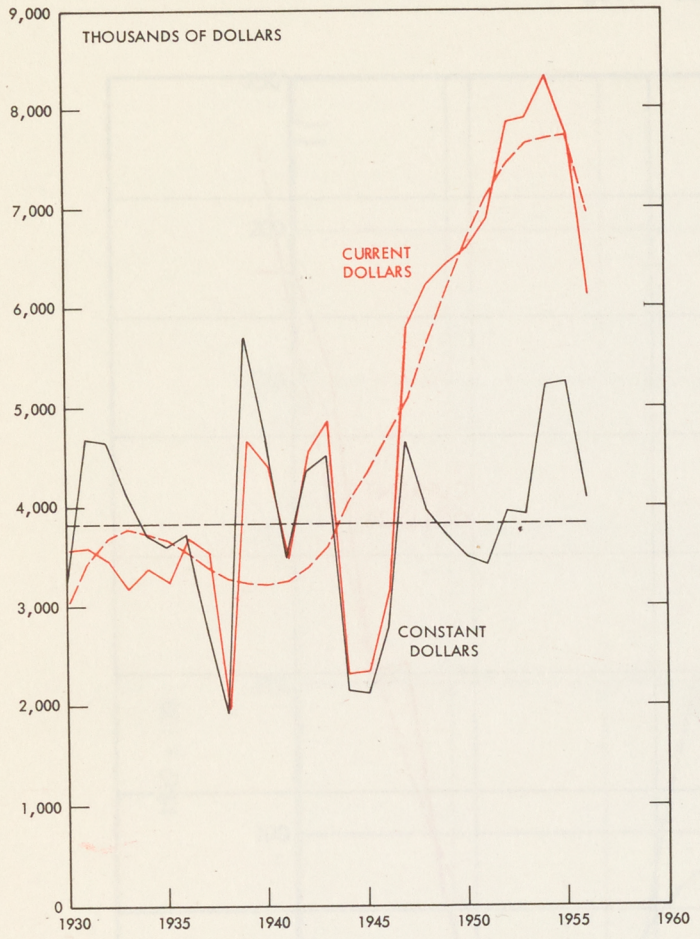


FIG. 6

OUTPUT OF SASKATCHEWAN SLAUGHTER AND MEAT PACKING HOUSES
1930 - 1956

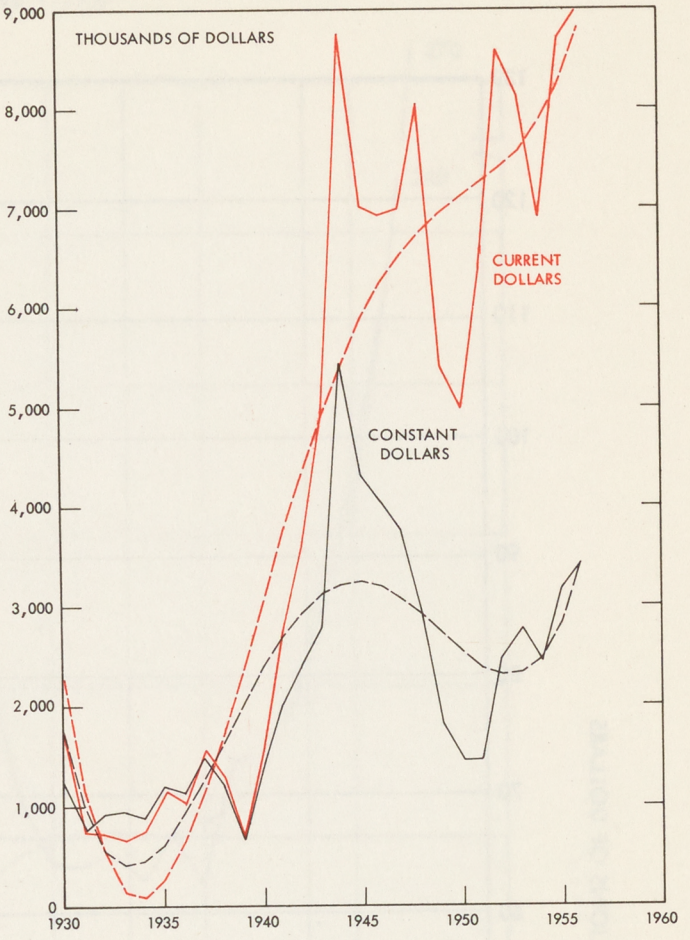


FIG. 7

OUTPUT OF SASKATCHEWAN BUTTER AND CHEESE
1930 - 1956

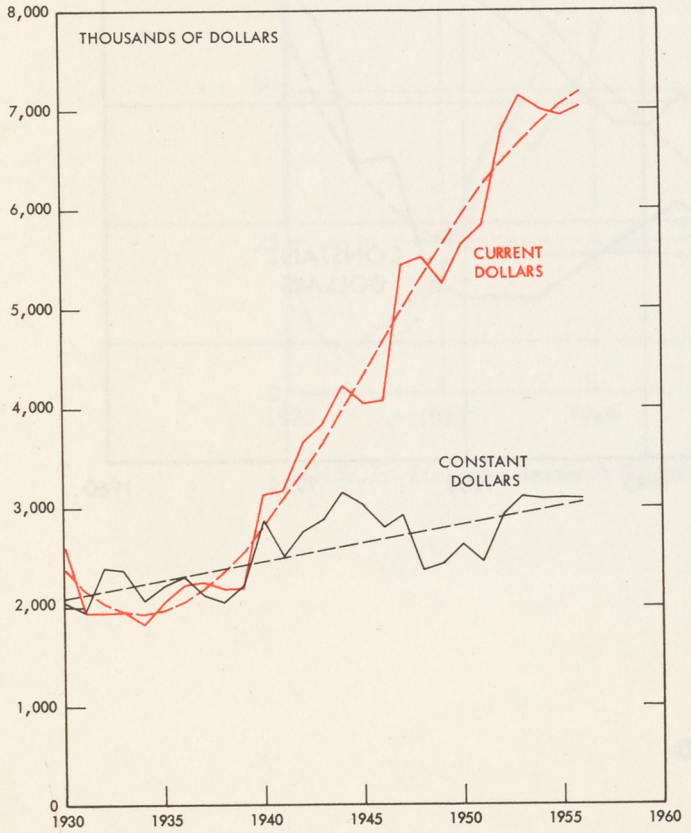
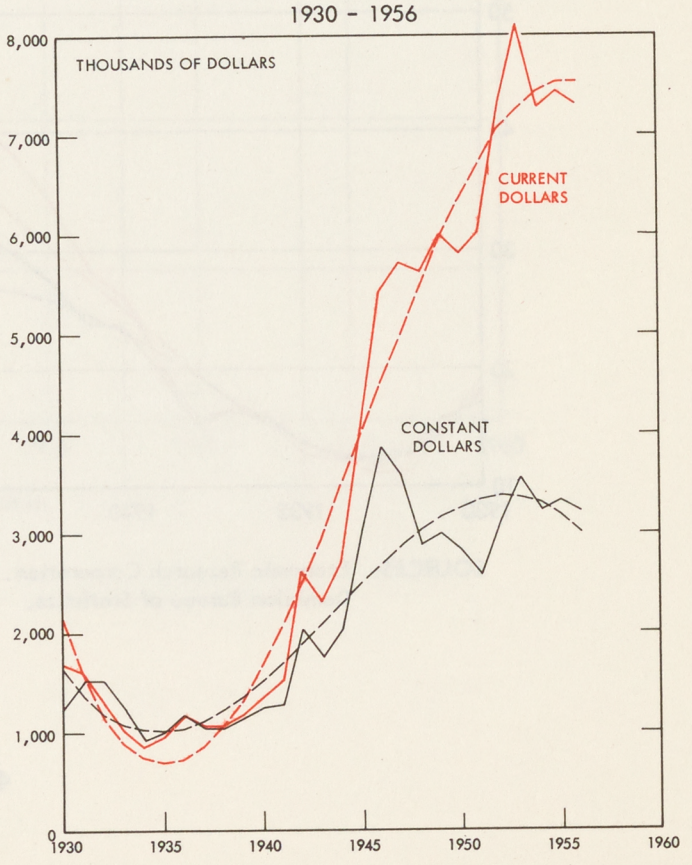


FIG. 8

OUTPUT OF SASKATCHEWAN BREWERIES
1930 - 1956



SOURCES: Economic Research Corporation.
Dominion Bureau of Statistics.

FIG. 9

OUTPUT OF SASKATCHEWAN
CARBONATED BEVERAGES
1930 - 1956

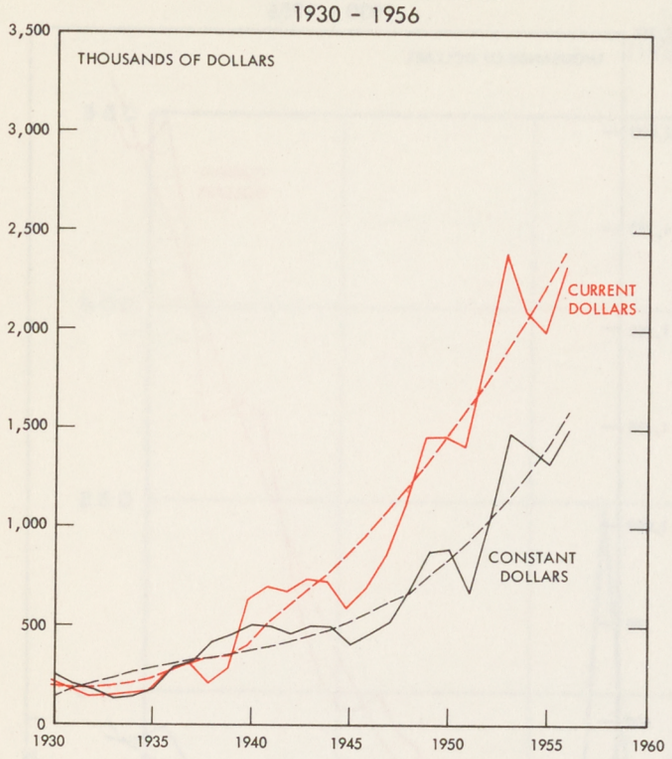


FIG. 10

OUTPUT OF SASKATCHEWAN SAWMILLS
1930 - 1956

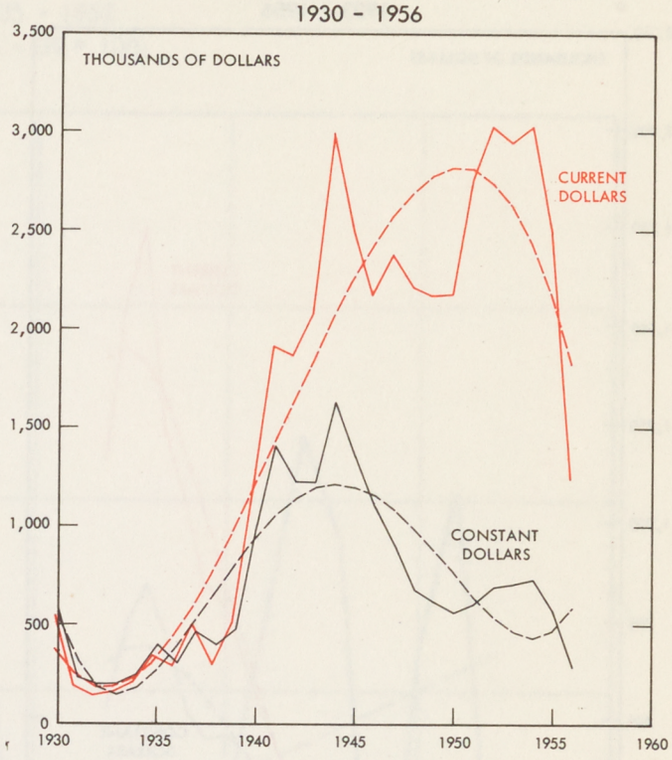


FIG. 11

OUTPUT OF SASKATCHEWAN FEEDS,
STOCK AND POULTRY, PREPARED
1944 - 1956

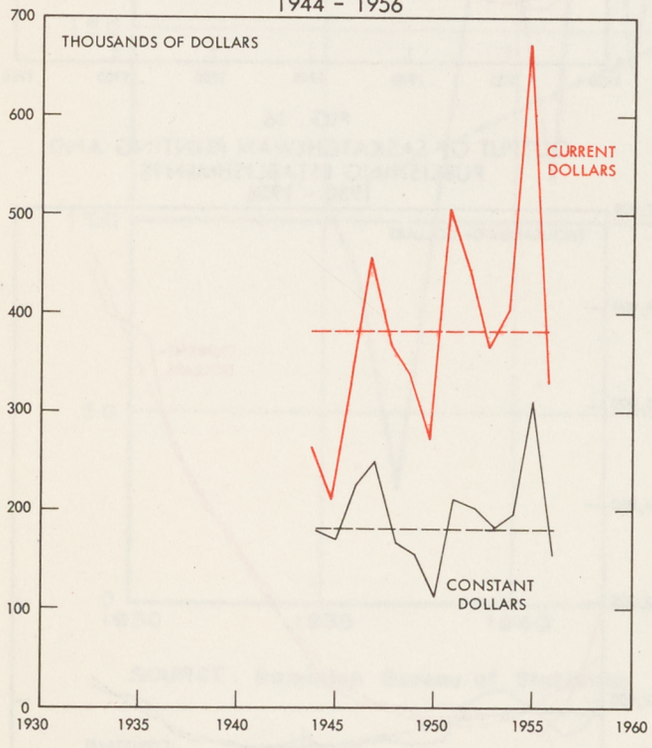
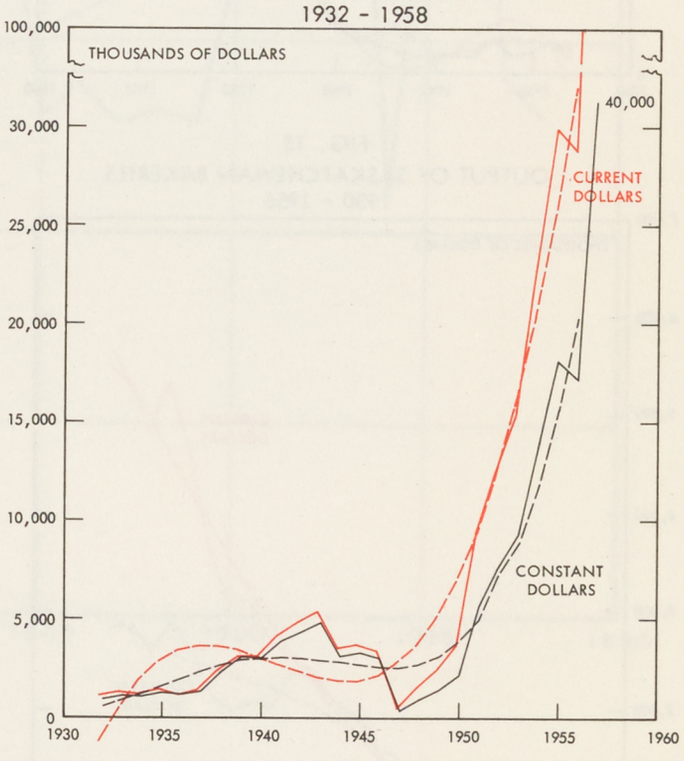


FIG. 12

OUTPUT OF SASKATCHEWAN PETROLEUM
AND COAL PRODUCTS
1932 - 1958



SOURCES: Economic Research Corporation.
Dominion Bureau of Statistics.

FIG. 13

OUTPUT OF SASKATCHEWAN SHEET METAL PRODUCTS
1933 - 1956

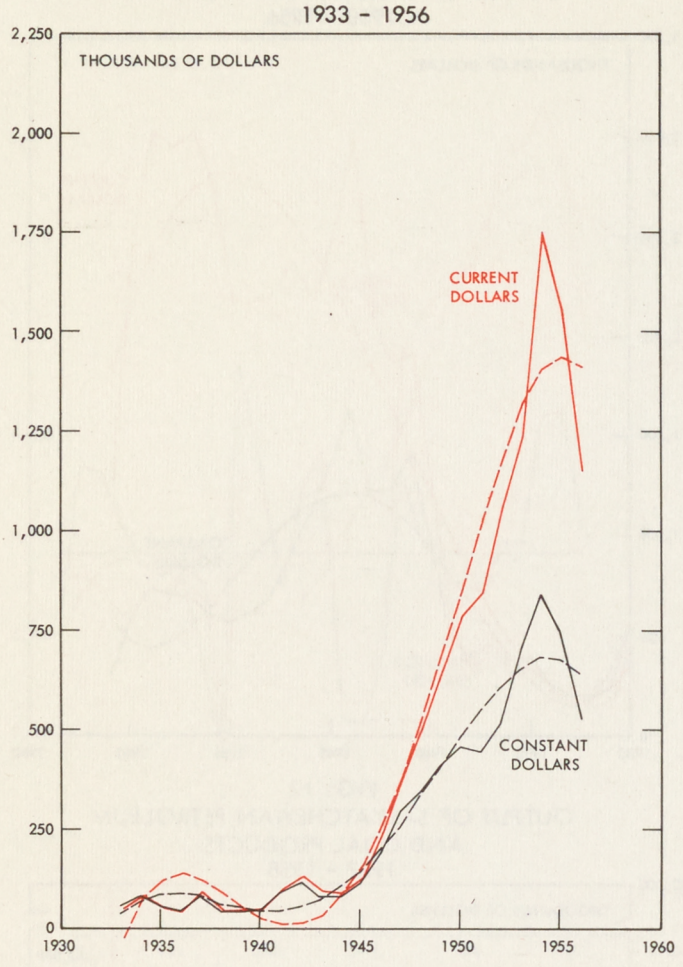


FIG. 14

OUTPUT OF SASKATCHEWAN SASH, DOOR AND PLANING MILLS
1930 - 1956

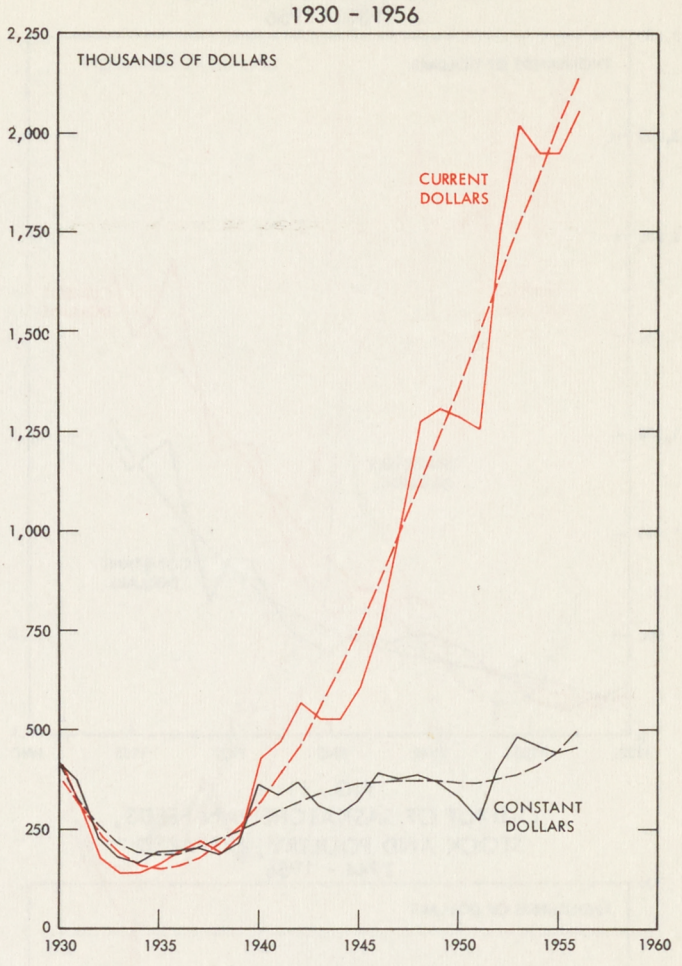


FIG. 15

OUTPUT OF SASKATCHEWAN BAKERIES
1930 - 1956

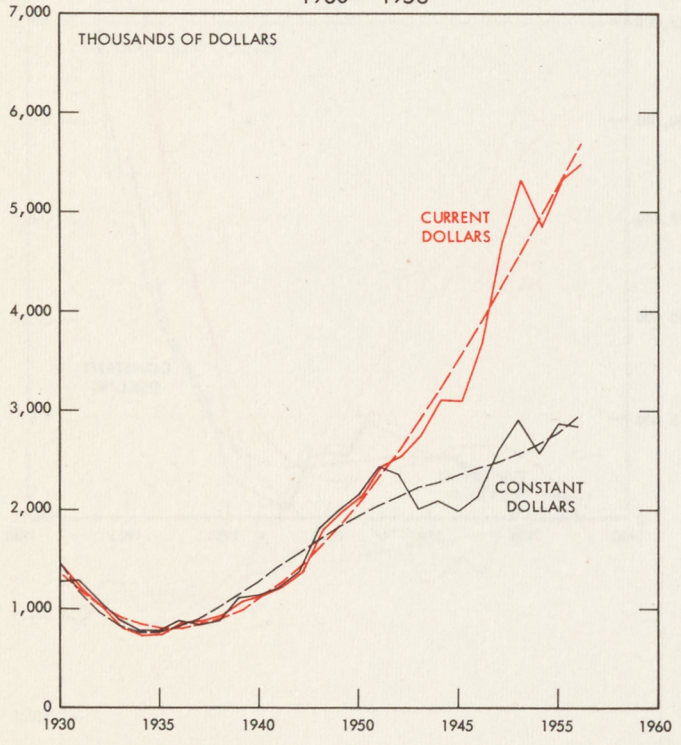
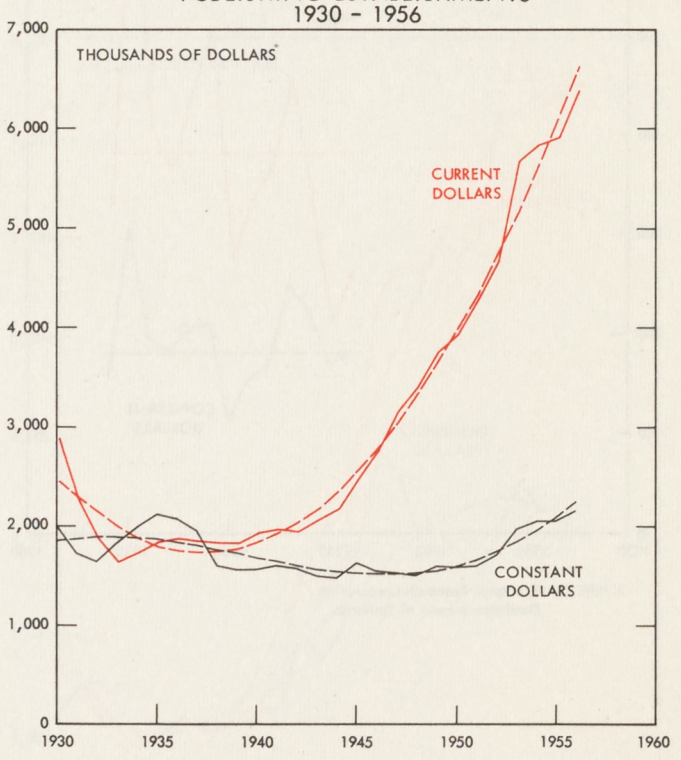


FIG. 16

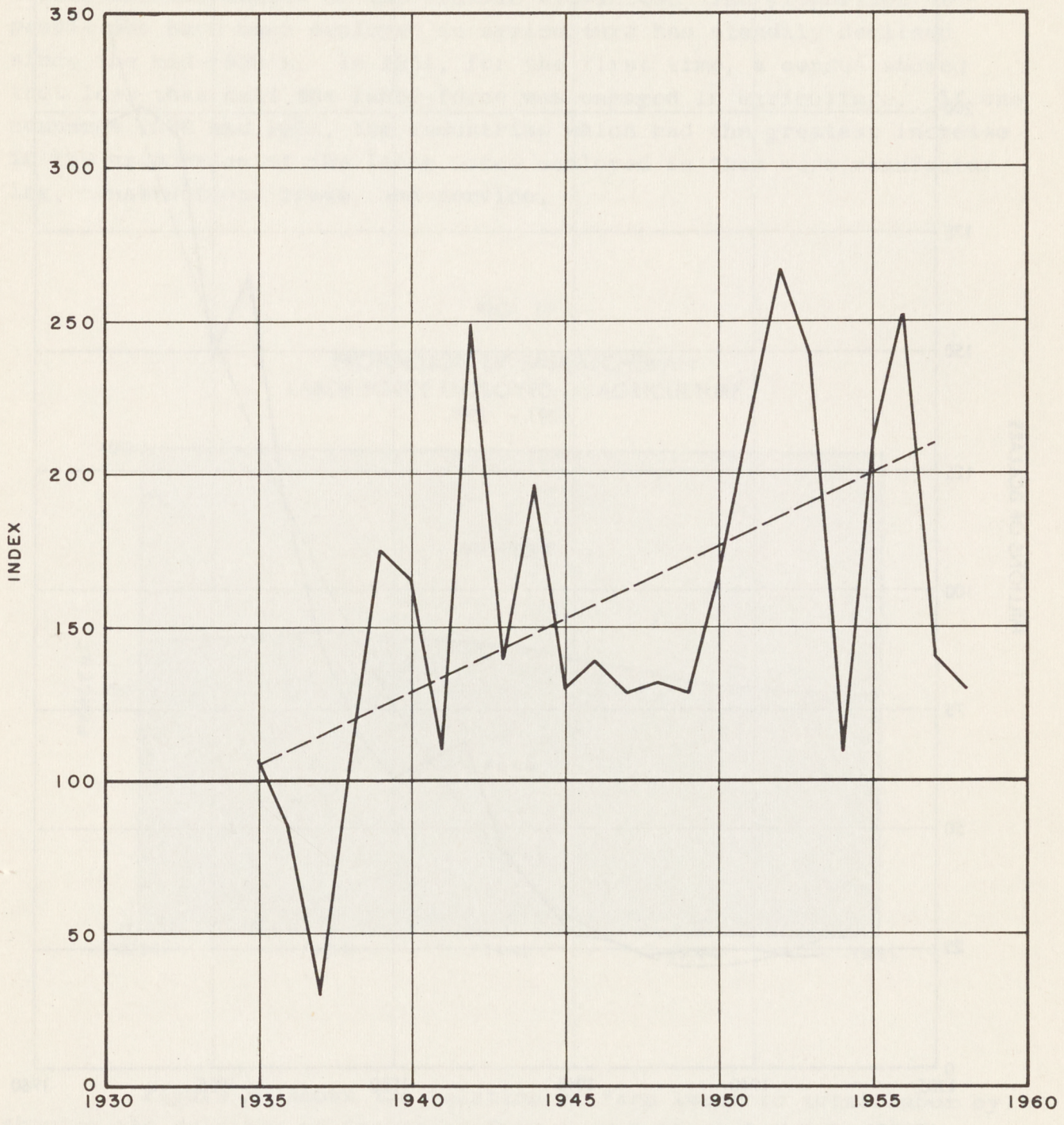
OUTPUT OF SASKATCHEWAN PRINTING AND PUBLISHING ESTABLISHMENTS
1930 - 1956



SOURCES: Economic Research Corporation.
Dominion Bureau of Statistics.

FIG. 17

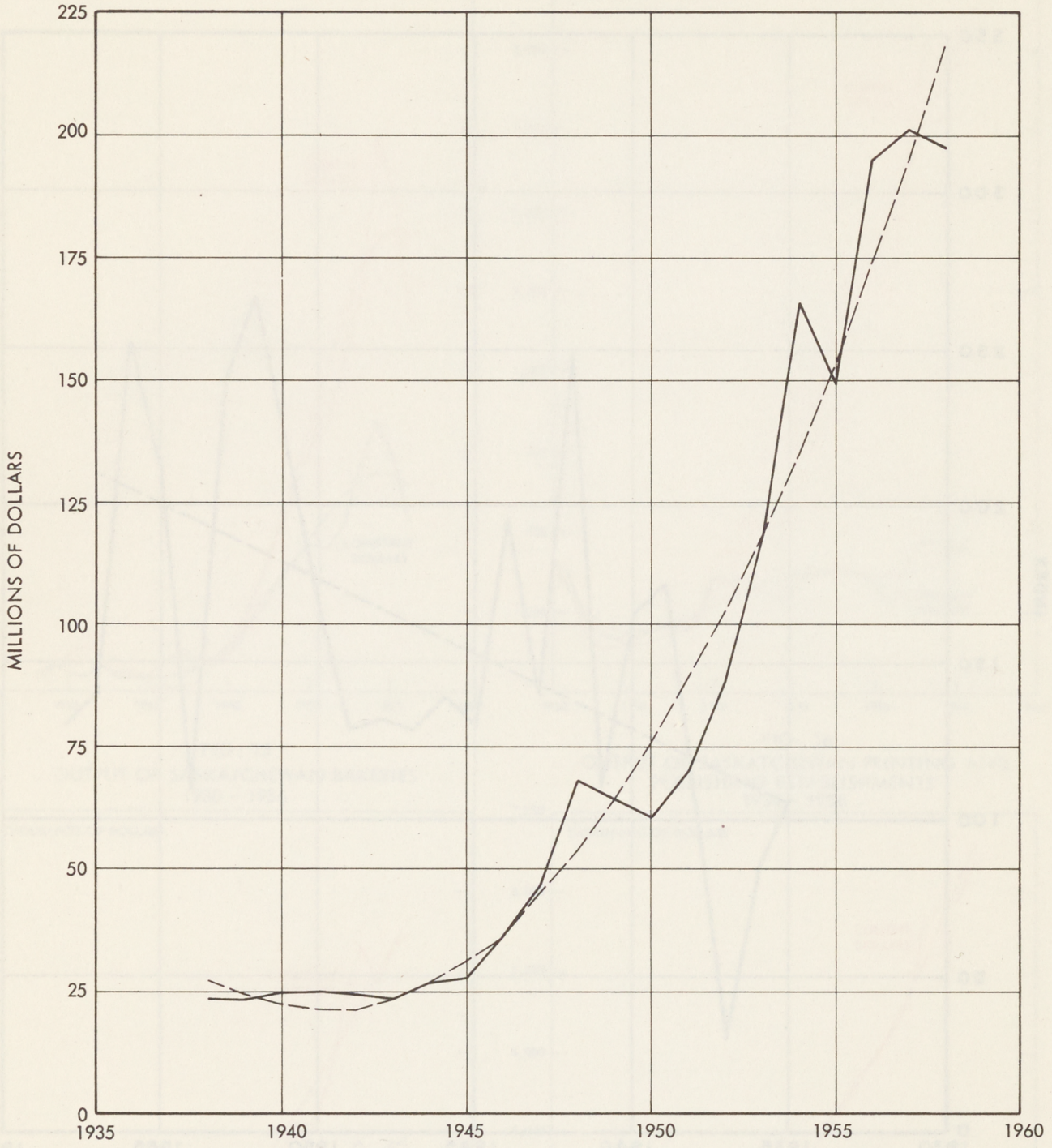
INDEX OF AGRICULTURAL PRODUCTION IN SASKATCHEWAN
1935 - 1958
(1935 - 39 = 100)



SOURCE: Dominion Bureau of Statistics.

FIG. 18

TOTAL NET VALUE OF CONSTRUCTION IN SASKATCHEWAN
1938 - 1958



SOURCE: Dominion Bureau of Statistics.

Input in Nonagricultural Industries. The universal resource which is an input in every industry is, of course, labor. Figure 19 illustrates the changing proportion of the labor force which has been employed in agriculture and other industry as shown by the Dominion Census and the Census of the Prairie Provinces. The proportion of people who have been employed in agriculture has steadily declined since the mid-1930's. In 1951, for the first time, a census showed that less than half the labor force was engaged in agriculture. If one compares 1936 and 1951, the industries which had the greatest increase in the proportion of the labor force employed in them were manufacturing, construction, trade, and service.

FIG. 19

PROPORTION OF SASKATCHEWAN
LABOR FORCE EMPLOYED IN AGRICULTURE
1931 - 1951

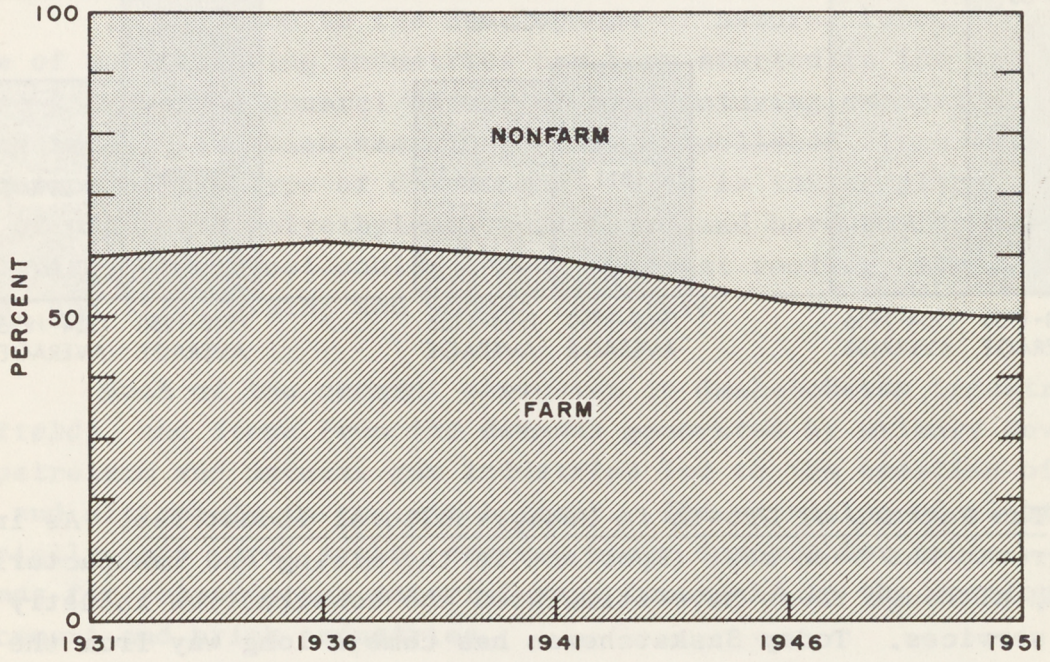
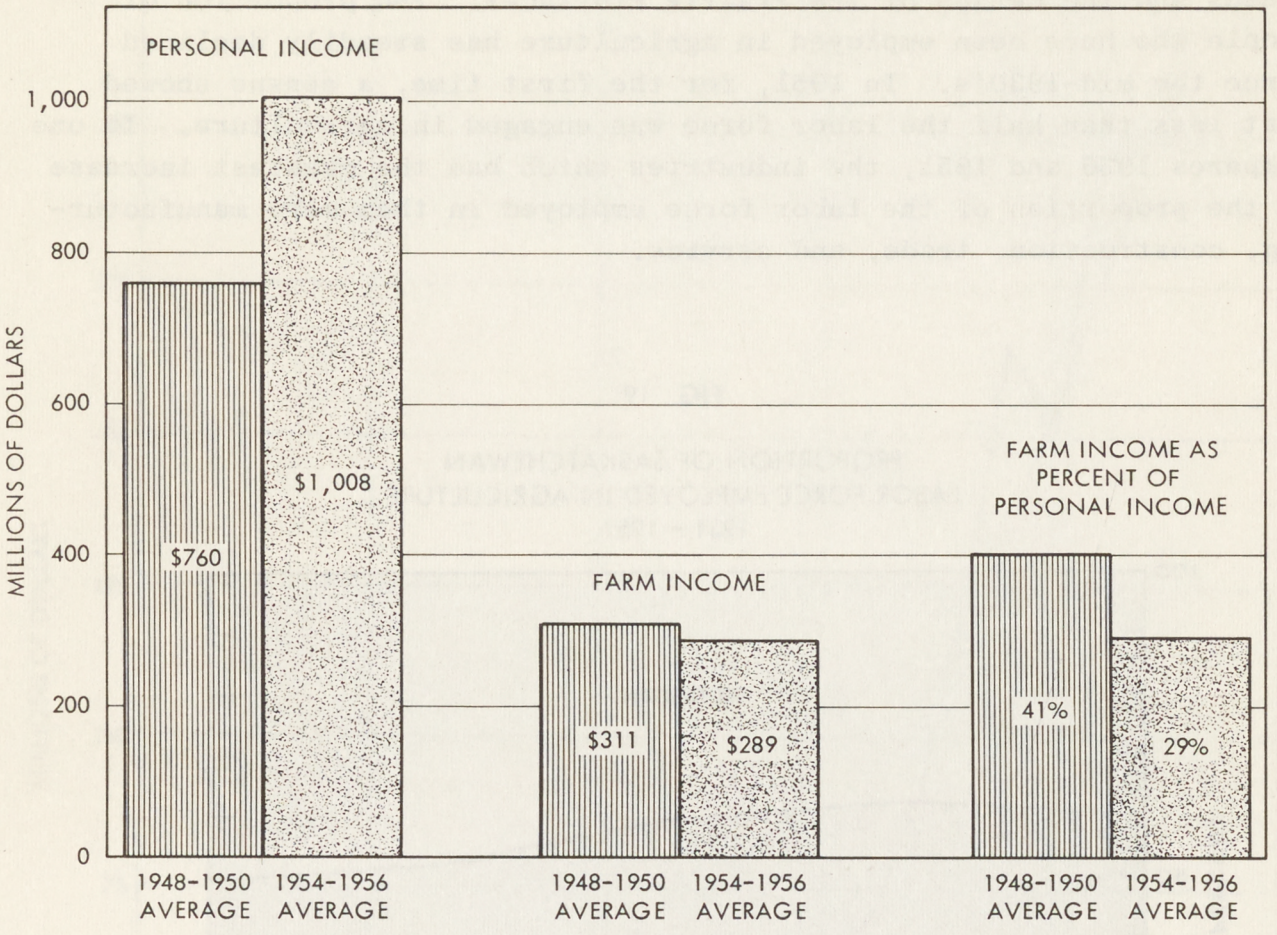


Figure 20 shows the relation of farm labor to total labor by showing the relation of income of farm operators to total personal income in the province. Of course, the instability of farm income renders year-to-year comparisons difficult, but when averages are considered, the downward trend of the proportion of personal income originating in the farm sector and the declining relative importance of agriculture as an industry is readily apparent.

FIG. 20

PERSONAL AND FARM INCOME IN SASKATCHEWAN
1948-1950 AVERAGE COMPARED WITH 1954-1956 AVERAGE



The Pattern of Growth in Nonagricultural Industries. As indicated, growth has been most important in the mining and manufacturing industries, although these have stimulated the construction industry and other services. Today Saskatchewan has come a long way from the time when it was merely "the wheat province." During the past ten years in particular, the diversification from a purely agricultural economy has been most marked.

The discovery of oil in the province has led to a thorough examination of the province's sedimentary basin which extends over a vast area from the international boundary to La Ronge in the north. In the course of this search for oil, huge resources of potash were discovered. In addition, huge resources of sodium sulphate, sodium chloride, and magnesium chloride and various sand, clay, pumicite, and

bentonite deposits are known to exist along with coal, which is found just north of the United States boundary. Indications of helium have been detected quite recently; at the present time the British American Oil Company is conducting investigations. Finally, there is the Choiceland iron ore deposit which may ultimately provide an important source of raw materials for the province's growing steel industry.

The important mining developments have been in petroleum and natural gas, uranium, and potash. These new resources represent an expansion and diversification of an already healthy mining industry--base metals and industrial minerals. These resources and the industries based upon them are given full consideration in Section V.

The other primary industries, forestry, fishing, and trapping, have not played a prominent role in the economy of the province although they are of considerable importance in the northern region. The potential for the forest industry is covered in greater detail in Section VI.

In addition to the development of natural resources, a wide range of manufacturing industries has been started in the province. Figure 2 shows the general nature of manufacturing expansion. The following industries which are among those established since 1955 give an indication of the type of development which is taking place: multiwall bags of paper and polyethylene; soft board and hard board; colored photo developing; electrical cable; cement; precast roofing; steel pipe, plate, skelp, and structurals; and wooden furniture.

Much of the current expansion in Saskatchewan industry is in new fields, and stems from the demands generated by primary development. The petroleum and natural gas industries led to the creation of the pipe mill and ultimately to the steel plant. The extension of electrification, especially into rural areas, created heavy demands for cable. The strong demands for construction material were important in the development of the cement and brick industries.

The net sum of these industrial changes has made its impact felt on a wide range of tertiary industries, has promoted the growth and urbanization of population, and stimulated increases and stability in incomes. The province faces a future in which diverse types of industry will bring a new buoyancy and stability to the economy.

Diversification within Agriculture

There are a number of barriers to diversification within an industry, especially when that industry is agriculture. First, land is immobile in the sense that it may be especially suited to the production of a particular crop and uneconomic if used for other purposes. Second, a decision to begin a new enterprise or expand an old one may call for the acquisition of persons with some skill or experience in the activities of the enterprise. In the case of agriculture, it may mean training or retraining the present work force in new methods and techniques. There may be considerable and effective resistance to change because the owner of the farm himself may have to be retrained. Third, the nature of the farmer's problems may breed a resistance to change. When there is such great variability in returns from one season to the next, the advantage of a shift from one product to another may be far from apparent. In fact, it may be entirely lost in the fluctuations of the financial returns.

Although recent years have witnessed a growing trend toward diversification within agriculture in Saskatchewan, cereal grains, especially wheat, still remain the predominant feature; wheat took up 60 percent of seeded acreage in 1956 (see Table 9).

Table 9

SEEDED ACREAGE IN SASKATCHEWAN
1956-1957

Crops	Acres (thousands)	Percent
Wheat	14,569	60%
Oats	3,670	15
Barley	3,027	12
Rye	300	1
Flaxseed	1,710	7
Hay	647	3
Rapeseed	297	1
Other Field Crops	213	1
Total	24,433	100%

Source: D.B.S. data.

Climate has caused very considerable variations in wheat yield. For instance, the average wheat yield for the whole province has varied from 2.6 bushels per seeded acre in 1937 to 27 bushels in 1952, with a long-term average of about 15 bushels per acre (see Table 10). Thus even though the acreage seeded to wheat has remained relatively stable since 1930, varying (with a few exceptions) between 13 million and 16 million acres, the sharp differences in wheat production have accounted for the wide fluctuations in total agricultural production. In turn, the differences in production, combined with the variability of wheat prices, have accounted for most of the variations in net farm income in Saskatchewan.

Rapeseed is assuming some importance. Although introduced only in the early 1940's, by 1957 this crop was returning just over $13 million. The coarse grains have had no consistent pattern, except barley, which, though by no means a challenger for wheat, has displayed steady, if unspectacular growth. In 1920, about half a million acres were seeded in barley. In 1956, slightly over three million acres were sown, approximately a fifth of the acreage devoted to wheat.

A long-term program by the Department of Agriculture has encouraged the development of pastures. This has given increased emphasis to raising cattle as well as field crops. Nevertheless, in 1956 less than 3 percent of the total improved farmland was in pasture, and nearly all the remainder was under crops or in summer fallow (see Table 11).

The completion of the South Saskatchewan River Development project will give encouragement toward further agricultural diversification.

Investment

Perhaps the most significant measure of growth is to be found in the almost threefold increase in capital investment in Saskatchewan in the period 1948-58 and the more than twofold increase in capital and repair expenditures. Capital investment has climbed from $165 million in 1948 to $464 million in 1958, and repair expenditures have climbed from $76 million to $148 million during the same period. Total capital and repair expenditures have risen from $241 million in 1948 to $612 million in 1958 (see Table 12).

Table 10

WHEAT IN SASKATCHEWAN
1920/21-1957/58

Crop Year	Seeded Acreage (thousands of acres)	Average Yield per Seeded Acre (bushels)	Production (thousands of bushels)	Average Farm Price (dollars per bushel)	Total Farm Value (thousands of dollars)
1920-21	10,061	11.2	113,135	$1.55	$175,360
1921-22	13,557	13.9	188,000	0.76	142,880
1922-23	12,332	20.3	250,167	0.85	212,642
1923-24	12,791	21.2	271,622	0.65	176,554
1924-25	13,033	10.2	132,918	1.21	160,831
1925-26	12,509	18.8	235,472	1.25	294,281
1926-27	13,558	16.2	219,646	1.08	237,218
1927-28	12,979	19.5	252,500	0.97	244,925
1928-29	13,791	23.3	321,215	0.77	247,336
1929-30	14,445	11.1	160,565	1.03	165,382
1930-31	14,326	14.4	206,700	0.47	97,149
1931-32	15,026	8.8	132,466	0.38	50,337
1932-33	15,543	13.6	211,551	0.35	74,043
1933-34	14,743	8.7	128,004	0.47	60,162
1934-35	13,262	8.6	114,200	0.61	69,662
1935-36	13,206	10.8	142,198	0.60	85,319
1936-37	14,744	7.5	110,000	0.92	101,200
1937-38	13,893	2.6	36,000	1.05	37,800
1938-39	13,793	10.0	137,800	0.58	79,924
1939-40	14,233	19.1	271,300	0.54	146,502
1940-41	15,571	17.1	266,700	0.58	154,686
1941-42	12,217	12.0	147,000	0.59	86,730
1942-43	12,353	24.7	305,000	0.77	234,850
1943-44	9,622	15.2	146,000	1.14	166,440
1944-45	13,200	18.3	242,100	1.25	302,625
1945-46	13,610	12.4	168,100	1.64 1/	275,684
1946-47	14,226	14.6	208,000	1.62 1/	336,960
1947-48	14,226	12.2	173,000	1.63 1/	281,990
1948-49	14,389	13.3	191,000	1.63 1/	311,330
1949-50	15,737	11.8	186,000	1.61 1/	299,460
1950-51	16,500	16.5	272,000	1.49	405,280
1951-52	15,635	20.8	325,000	1.52	494,000
1952-53	16,600	27.0	449,000	1.59	713,910
1953-54	16,800	23.3	391,000	1.33	520,030
1954-55	16,600	10.2	169,000	1.22	204,853
1955-56	14,100	22.7	320,000	1.38	441,600
1956-57	14,569	24.4	355,000	1.24	440,200
1957-58	13,365	15.8	211,000	1.20	253,200
1958-59	13,182	14.6	192,000	1.13	216,960

1/ Includes effect of 8.3 cents per bushel final payment as announced in Parliament on March 2, 1951.

Source: D.B.S. data.

Table 11

TYPES OF FARMLAND IN SASKATCHEWAN
1956

Farmland	Acres (thousands)
Under Crops	24,481
Summer Fallow	14,193
Pasture	1,128
Other	704
Total Improved	40,506
Woodland	2,379
Other	19,909
Total Unimproved	22,288

Source: D.B.S. data.

Table 12

PRIVATE AND PUBLIC NEW CAPITAL INVESTMENT
IN SASKATCHEWAN
1948-1958
(Millions of Dollars)

Year	Capital Expenditures		Repair and Maintenance Expenditures				Capital, Repair, and Maintenance Expenditures		
	Construction	Machinery and Equipment	Total	Construction	Machinery and Equipment	Total	Construction	Machinery and Equipment	Total
1948	$ 74.6	$ 90.8	$165.4	$37.5	$38.5	$ 76.0	$112.1	$129.3	$241.4
1949	83.6	128.0	211.6	53.8	46.5	100.3	137.4	174.5	311.9
1950	99.1	138.5	237.6	56.8	51.5	108.3	155.9	190.0	345.9
1951	89.6	148.6	238.2	64.1	56.8	120.9	153.7	205.4	359.1
1952	138.2	175.2	313.4	62.6	57.5	120.1	200.8	232.7	433.5
1953	176.5	180.9	257.4	67.1	51.6	118.7	243.6	232.5	476.1
1954	226.5	150.3	376.8	67.4	62.2	129.6	293.9	212.5	506.4
1955	219.3	130.5	349.8	63.9	58.4	122.3	283.2	188.9	472.1
1956	298.5	187.4	485.9	66.6	71.0	137.6	365.1	258.4	623.5
1957	278.3	177.1	455.4	74.8	72.8	147.6	353.1	249.9	603.0
1958	301.1	162.9	464.0	74.9	73.3	148.2	376.0	236.2	612.2

Source: Private and Public Investment in Canada Outlook, "Regional Estimates," Department of Trade and Commerce and D.B.S.

Other Indicators

There are other indicators which may be used to gauge the growth of the whole economy rather than any specific sector. Such a measure is the value of retail trade (see Table 13). In the last decade, Saskatchewan's retail trade has almost doubled in value, for an increase of 91 percent--an increase of about 65 percent in constant dollars.

Another significant indicator is total vehicle registrations which also have almost doubled in the last decade, rising from 168,000 to 313,000 (see Table 14).

Still other factors indicative of the growth of the Saskatchewan economy are such miscellaneous factors as the number of telephones in use (Table 15) and the amount of life insurance sold in the province (Table 16). In the last decade in Saskatchewan, there has been an increase in the number of telephones in use per 100 people from 14.3 to 24.5 or 71 percent, while average monthly life insurance sales have jumped from $3.6 million in 1948 to $10.8 million in 1958, or an increase of 200 percent.

Social and Political Factors in Economic Growth

Provincial Political Factors

In the foregoing discussion of changes in economic activity, considerable attention was paid to the history of the early 1930's in Saskatchewan. Knowledge of the circumstances of those years is necessary for an understanding of the economic opportunities and possible limitations of the province at the present time. Also, some of the social and political attitudes created in the 1930's have been reflected in legislation. The economic changes have not been independent of social and political change. Government policies have influenced the pattern of economic growth and in turn have been conditioned by the needs arising in the business environment.

Since 1944, the same political party has been in power in Saskatchewan. This party, the Co-operative Commonwealth Federation (CCF), is known as a socialist party. Perhaps a contributing reason for its establishment was certain attitudes created during the depression of the 1930's. For example, as a result of the depression, two very strong attitudes were created in the Saskatchewan farmer. One, which antedated the depression, was a distrust of middlemen, which included all who added charges to the cost of the farmer's wheat--from elevator operators

Table 13

ESTIMATED RETAIL TRADE IN SASKATCHEWAN
1930-1958
(Millions of Dollars)

Year	Estimated Retail Trade	
	Actual	Constant[1/]
1930	$188	$250
1935	124	207
1940	174	265
1948	473	488
1949	538	538
1950	571	555
1951	659	580
1952	764	656
1953	845	732
1954	758	652
1955	748	643
1956	812	688
1957	855	701
1958	902	721

1/ Based on Canadian consumer price index 1949 = 100.

Sources: Canadian Statistical Review, 1955, Supplement No. 2, D.B.S.
Canadian Statistical Review, 1957, Supplement No. 3, D.B.S.
Canadian Statistical Review, 1959, Vol. 34, No. 9, D.B.S.

Table 14

MOTOR VEHICLE REGISTRATIONS
IN SASKATCHEWAN
1945/46-1958/59

Registration Year (April 1-Mar. 31)	Truck and Tractor[1/] Registrations		Total Vehicle Registrations	
	Total	Per 100 Population	Total	Per 100 Population
1945-46	42,956	5.2	140,257	16.8
1946-47	46,341	5.6	148,206	17.7
1947-48	52,072	6.2	158,512	18.9
1948-49	56,370	6.7	167,515	19.9
1949-50	63,153	7.6	185,027	22.2
1950-51	69,073	8.3	199,866	23.9
1951-52	77,201	9.3	215,450	25.8
1952-53	87,996	10.4	237,014	28.1
1953-54	98,517	11.4	257,504	29.9
1954-55	103,642	11.8	267,373	30.6
1955-56	107,281	12.2	274,950	31.3
1956-57	110,291	12.5	291,053	33.0
1957-58	112,759	12.8	300,094	34.1
1958-59[2/]	113,844	12.8	313,038	35.2

1/ Excludes farm tractors.
2/ Up to February 28,1959.

Sources: The Motor Vehicle, D.B.S. 1958-59: Saskatchewan Treasury Dept., Motor Licenses Branch.

Table 15

NUMBER OF TELEPHONES IN USE IN SASKATCHEWAN
1930-1958
(Thousands)

Year	Telephones	
	Total	Per 100 Population
1930	94	10.4
1935	77	8.3
1940	85	9.4
1945	103	12.3
1946	108	12.9
1947	113	13.5
1948	120	14.3
1949	127	15.3
1950	135	16.2
1951	143	17.2
1952	154	18.3
1953	165	19.2
1954	176	20.0
1955	184	21.0
1956	195	22.1
1957	206	23.4
1958	218	24.5

Source: D.B.S. telephone statistics.

Table 16

LIFE INSURANCE SALES IN SASKATCHEWAN
1930-1958
(Millions of Dollars)

Year	Average Monthly Face Value of Sales	
	Total	Per 1,000 Population
1930	$ 3.00	$0.33
1935	1.24	0.13
1940	1.08	0.12
1945	3.29	0.39
1946	4.22	0.51
1947	3.78	0.45
1948	3.57	0.43
1949	3.90	0.47
1950	3.69	0.44
1951	3.74	0.45
1952	4.94	0.59
1953	5.83	0.68
1954	6.15	0.70
1955	7.18	0.82
1956	7.82	0.89
1957	9.56	1.09
1958	10.79	1.21

Source: Canadian Statistical Review based on Monthly Survey of Life Insurance Sales in Canada, Life Insurance Agency Management Association, Hartford, Conn., D.B.S.

to railroads. The second was a belief that the farmer's destiny was being controlled by persons outside the province. Among these were the implement manufacturers, the railroad managers, and members of the Winnipeg Grain Exchange. The farmer saw the price of grain fall but saw no corresponding fall in the prices of articles he had to buy.

These two attitudes created in farmers a strong desire to control their economic destiny. As a result, they formed the Wheat Pool and the Grain Growers' Association to control the marketing of wheat. For the same reason they have supported the Canadian Wheat Board. They have also formed cooperative retail organizations which compete with the many retail establishments, large department stores, and mail-order houses serving Saskatchewan and the rest of Canada.

The retail cooperative organizations were integrated with the wholesale cooperatives, thus forming a strong purchasing entity. Then it was found that for some commodities the cooperatives had sufficient demand to establish processing or manufacturing establishments. For instance, the second largest oil refinery in Saskatchewan is owned by the Co-operative, despite the fact that two of the largest private oil companies in Canada also operate refineries in the province.

Because of the background of the economy in Saskatchewan and experience in the 1930's, CCF believes in the desirability of public and cooperative ownership as a means of dealing with some of the economic problems of the province. The general policy of the present government of Saskatchewan can best be summarized by two quotations from the Provincial Treasurer. In the Budget Speech of March 6, 1957 he said:

> The budget objectives today are precisely the same as those I outlined in my first budget address thirteen years ago. I said then (and I quote): "It is my duty to administer the financial affairs of this province as to enable my colleagues and myself to plan a wide expansion in the fields of health, education, pensions, and the like. Secondly, it is my task to tap the available investment resources for a planned and full development of old and new industries in this province. This Government is determined to do all it possibly can to improve the condition of our people and to broaden their opportunities for the future."

On February 28th of the following year, again in the Budget Speech, he said:

More specifically, the objectives of this budget are six-fold: to further educational opportunity in the province; to improve and diversify our basic agricultural industry; to stimulate economic growth and resource development; to maintain and extend Saskatchewan's leadership in the fields of health and welfare; to lighten the financial burden borne by local government; and finally, to do everything possible to maintain the economy at a high level and alleviate the threat of unemployment.

In the economic sphere, it has been the stated aim of the administration to achieve a blending of private, cooperative, and public enterprise to achieve the twin goals of economic efficiency and personal welfare.

Three special agencies have been created to encourage private industry, the Industrial Development Office, the Saskatchewan Research Council, and the Industrial Development Fund.

Assistance has also been extended to cooperative enterprises which have flourished primarily in the fields of farm production, retail and wholesale trade, and in finance as credit unions.

In the field of public enterprise, the provincial government has taken positive steps to promote industrial development by expanding existing Crown-owned corporations, mainly utilities, and by introducing certain new lines of activity oriented to resource development and marketing.

Other government activities have contributed to the development of provincial industry. Among these the most notable are the departments of Minerals Resources and Natural Resources. The policy of these departments is to provide information, and regulate and conserve the resources in such a way as to make them attractive prospects for development by private interests. Another agency of importance in industrial development is the Department of Labor, which administers labor standards and arbitrates disputes. Other departments which contribute indirectly are Education and Health and Welfare.

To deal with technical research, the Saskatchewan Research Council provides assistance in problems of a more general nature than those confronting a single firm. On the other hand, it orients its work to problems that are of more local importance than those that concern the National Research Council, a federal agency which provides

similar and broader services. The Saskatchewan Research Council was established in 1947 and until 1954 it operated on the basis of grants to members of the University of Saskatchewan and by scholarships to graduate students. Since 1954, the Council has been empowered to acquire property, employ personnel, and conduct its own financial affairs, and has now built its own headquarters and laboratories and acquired a staff.

The Council has undertaken research on behalf of industrial firms in the province; in particular, it has been retained to conduct some studies on the possibilities of utilizing native resources in industrial activities presently using imported components. It may well be that such activities will make important contributions to the future industrial progress of the region.

In analyzing the government's development activities through Crown Corporations, it would be misleading to suggest that the difference in the attitude of Saskatchewan toward public ownership of business enterprises differs in basic principle from that of other provinces or from that of earlier governments--the difference is one of emphasis and degree. In fact, this government differs from other provincial governments, not by holding a rigid philosophy not shared by others, but by encouraging the form of organization that should best perform the particular task at hand.

Public ownership of corporations is not new in Canada. Certain fields are viewed by Canadians as natural ones for public ownership. The Dominion government has long owned one of the railroads and the largest domestic air transportation system in Canada. Several provinces own their telephone systems. Electric power generation and distribution have also been placed under provincial ownership in other provinces. Thus, public ownership in itself does not constitute a radical innovation in the Canadian organization of industry.

The departure in Saskatchewan has been in the broad scope of public ownership. In other provinces, public ownership has been confined for the most part to transportation, communication, power, and defense industries. Saskatchewan is the only province that has entered extensively into ownership of other enterprises. At the present time, the province owns the following:

Saskatchewan Power Corporation (electricity and gas)

Saskatchewan Government Telephones

Saskatchewan Government Airways

Saskatchewan Transportation Company (bus line)

Saskatchewan Forest Products
- Saskatchewan Timber Board Division
- Saskatchewan Wood Enterprises Division

Saskatchewan Minerals
- Saskatchewan Sodium Sulphate Division
- Saskatchewan Clay Products Division

Saskatchewan Government Insurance Office

Saskatchewan Guarantee and Fidelity Company

Saskatchewan Government Printing Company

Saskatchewan Marketing Services
- Saskatchewan Fish Marketing Service Division
- Saskatchewan Fur Marketing Service Division
- Saskatchewan Government Trading Division

The first four of these companies are what may be termed utilities which are considered throughout Canada to be suitable for public ownership. The forest products and minerals companies deal with the disposition of resources. The marketing and trading services act as middlemen.

Saskatchewan Forest Products was formed to assist in the marketing of forest products. It conducts both woods and mill operations to produce lumber, pulpwood, poles, ties, fence posts, and fuel wood. Saskatchewan Minerals operates a brick plant and a sodium sulphate plant and markets the province's clays. Saskatchewan Marketing Services operates three divisions, one for fish filleting and marketing, one for fur marketing, and one that operates stores in remote northern settlements. Each of these corporations is designed to encourage resource development and in the case of the forest, fur, and fish services to provide employment and a new economic base for the inhabitants of the northern regions. In fulfillment of a long-held goal, in 1959 the Fish Marketing Service Division and the Government Trading Division were transferred to cooperative ownerships.

The question arises as to why the government of Saskatchewan has entered fields other than utilities. The reasons given by officials of the various organizations have emphasized the desire to provide non-agricultural employment in agricultural areas. In the case of the Insurance Office and the Guarantee and Fidelity Company, the government felt that the citizens of Saskatchewan could obtain lower rates of insurance, and that a local insurance company would retain, in the province, investment money that was going elsewhere. The Printing Office was set up to undertake printing for the government itself.

From the above it is clear that the primary direction of the extension of public ownership has been toward the utilization of resources and elimination of gaps left by private enterprise. The government has undertaken such enterprises only when private sources of investment have felt that the particular enterprises were too risky. In certain cases this has proved true, as demonstrated by the failure of three Crown Corporations in the late 1940's. However, it is worthy of note that, as a whole, Crown Corporations have been profitable ventures.

The Industrial Development Office was established by the provincial government in 1950 to encourage the movement of industry into Saskatchewan. The Office provides four services to industry. First, it conducts research into the available resources of the province and the markets available to industries based in the province. Second, as a result of this research, the Office provides information on available opportunities in the province. Third, as the agency that has primary responsibility for government relations with prospective industries, the Industrial Development Office provides liaison with any other government departments or offices that can furnish assistance. Finally, it may assist in obtaining financial backing for the concern.

The Industrial Development Fund was set up in 1947 to provide medium- and long-term loans at low rates of interest to assist in the financial organization of new companies. All money used by the fund is allocated by the provincial legislature and administered by the Government Finance Office. Applicants must be in the field of manufacturing or in industries providing certain services. They must show that the venture has a reasonably good chance of success and that the requested loan will not give the firm an advantage over a provincial firm already in existence.

Generally, loans may not exceed 50 percent of the agreed value of fixed assets of the applicant firm and are not to be given to provide working capital. The interest rate is currently 6.5 percent. Terms of repayment are subject to negotiation, but security is usually provided by the fixed assets of the enterprise. Applicants may not be eligible for a loan unless they have made application to the chartered banks or the federal Industrial Development Bank.

The Industrial Development Fund enables the provincial government to borrow relatively inexpensive capital in order to provide loans to companies that appear to have sound lines of approach but are unable to raise the money elsewhere. Loans made by the Fund have ranged from $270 to $900,000. Information from a sample of companies which have received loans from the Fund shows that loans totaling $1.05 million

have resulted in the establishment of industries which, as of January 1, 1959, possessed a total investment in fixed assets of $3.6 million. These firms manufactured products in 1958 with an approximate value of $9.5 million, 30 percent of which was sold in markets outside the province. The Industrial Development Fund represents a government service of primary importance to private industry and has contributed materially toward the goal of broadening the economic base of the province. Examples of government financial assistance to private industry are the cement plant, the pipe mill, and the steel rolling mill.

The provincial government has provided assistance to cooperatives and credit unions through the Department of Cooperation and Cooperative Development. These services consist primarily in the provision of advice and training for officers, guidance as to proper business practice, and auditing and bookkeeping services.

In summary, there can be no doubt that the activities of the provincial government, both direct and indirect, to stimulate economic activity through encouragement of private industry, assistance to cooperatives and Crown Corporations, and the creation of an environment designed to increase the national welfare of the people and be conducive to business operations, have met with success. However, it is impossible to make any estimate of the proportion of the impressive industrial growth of the 1950's which has been a direct or indirect result of these efforts.

Dominion Political Factors

Although the major responsibility for economic development lies with the provincial government, the Dominion government also plays an important role.

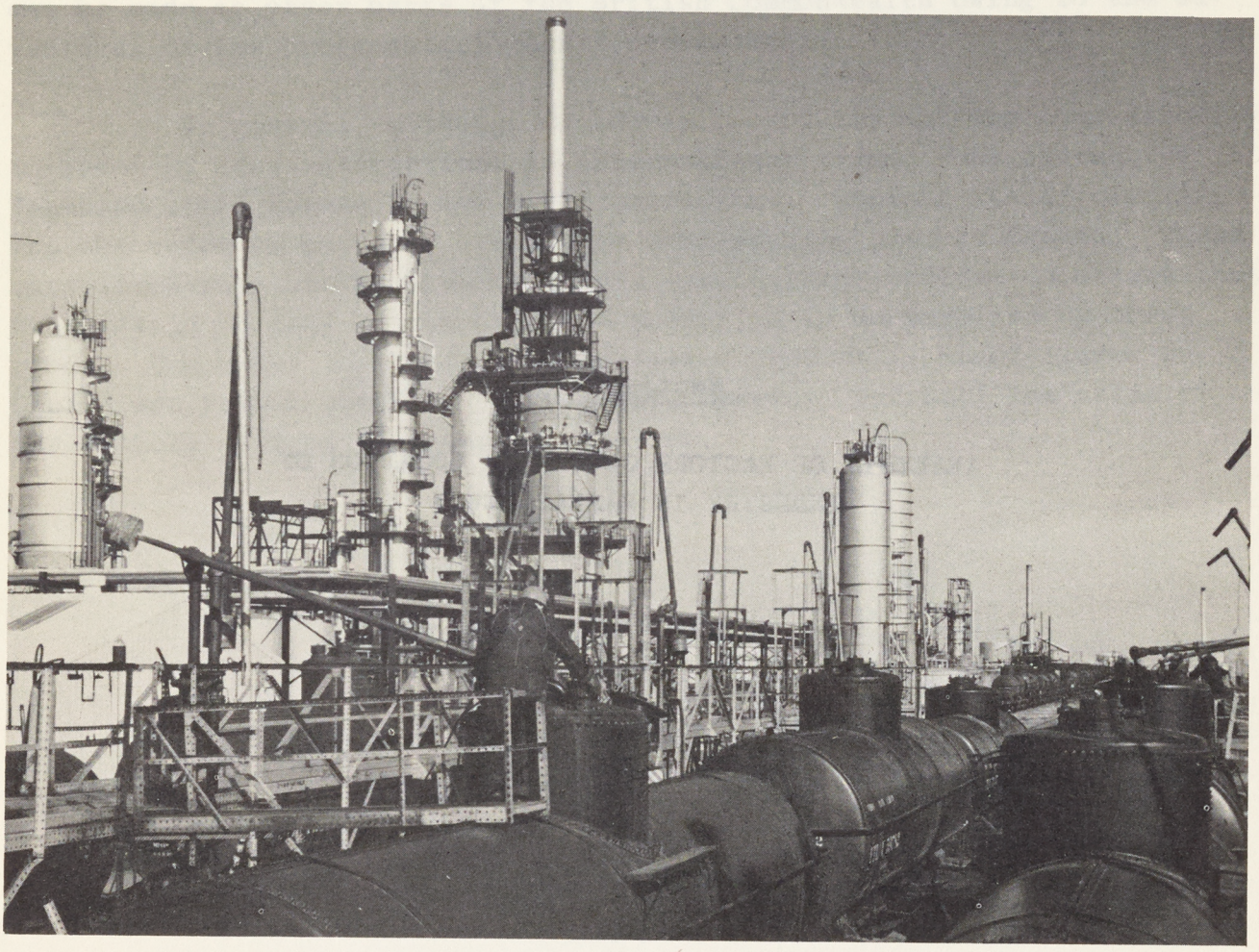
In encouraging the development of industry generally, the Dominion government has proceeded both directly and indirectly. Directly, it has established the Industrial Development Bank, the function of which is to assist in the provision of funds, on a mortgage basis, in the creation of new or the expansion of old enterprises. Indirectly, it assists the industry of the country by its tariff policies and by aiding exporting industries, as well as in the performance of the many normal functions of government in a free-enterprise economy. The tariff provisions are, of course, aimed at assisting new and established industries, and encouraging productivity and profits.

The import tariff of Canada has three schedules: British preferential, which applies to the British Commonwealth; most favored nation; and general. The existence of the Commonwealth preferential structure is of advantage to certain Canadian manufacturers who profit by its reciprocal nature. Some manufacturers establish in Canada because a Canadian location is attractive as a base from which shipments can be made to other parts of the British Commonwealth owing to the advantages of the preferential tariff provisions.

In general, although Canada is one of the nations most strongly in favor of less restrictions in international trade, some protective features still remain in the tariff structure. Certain tariff classifications refer to goods of a class or kind manufactured in Canada. These classifications can be created when a manufacturer affirms to Ottawa that at least 10 percent of the Canadian market is to be supplied by these goods. The rules that determine whether a product is manufactured in Canada are rather complex. In general, however, one-half the value of the article must be of Canadian creation.

Section IV

ANALYSIS OF FACTORS GOVERNING LOCATION OF INDUSTRY IN SASKATCHEWAN



Imperial Oil Company's Refinery at Regina

IMPERIAL OIL PHOTO

Section IV

ANALYSIS OF FACTORS GOVERNING LOCATION OF INDUSTRY IN SASKATCHEWAN

Saskatchewan has many favorable industrial location characteristics, some of which are offset to a considerable extent, or have been in the past, by the limited size of the local market and the distance to larger markets. For example, there seems to be little prospect of the development in the near future of the huge salt deposits in the province precisely because of these factors.

There are many other factors in addition to markets to take into account in a thorough analysis of the prospects for industry in Saskatchewan. Those considered most important are labor (supply, costs, and industrial relations); location and availability of production materials; transportation and distribution facilities; availability of industrial sites; living conditions (climate, housing, education, and health and recreation facilities); fuel, power, and water supplies; and the public and government attitude toward industry.

Numerous surveys of industrial development in other areas have indicated that of all these factors, markets, labor, and availability of raw materials are usually the most important (see Figure 21). Thus these three factors afford a guide to the assessment of industrial potential in Saskatchewan, when considered in conjunction with any unique features of the province.

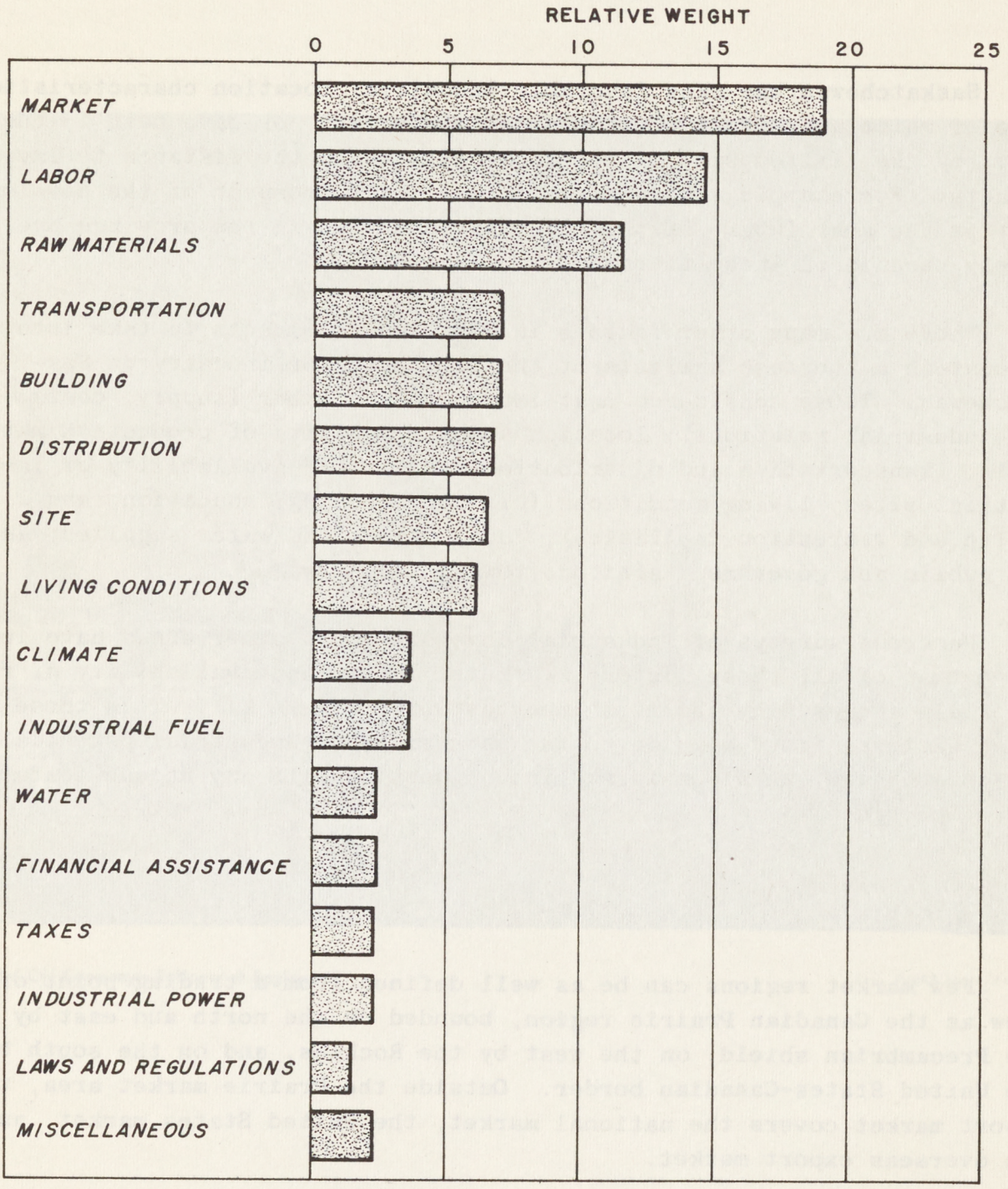
Markets

Few market regions can be as well defined from a trading point of view as the Canadian Prairie region, bounded on the north and east by the Precambrian shield, on the west by the Rockies, and on the south by the United States-Canadian border. Outside the Prairie market area, the export market covers the national market, the United States market, and the overseas export market.

In considering Saskatchewan as a potential location for industry, both the Prairie and export markets may be further broken down into consumer markets and industrial markets. The importance of these markets varies according to the type of industry. Since the Prairie market, both consumer and industrial, is relatively small, resource-based

FIG. 21

RELATIVE IMPORTANCE OF FACTORS INFLUENCING PLANT LOCATION



SOURCE: L. S. Paine, An Evaluation of Plant Location in Texas, Texas Engineering Experiment Station, College Station, Tex., Oct. 1954.

industries in Saskatchewan will be generally oriented to the industrial export markets. To the extent that there is manufacturing and industrial development in the Prairie region,however, this development will provide an increasing absolute demand for raw materials which could be a significant factor in the market for resource-based industries. Fabricating or processing industries may be oriented to local and export, consumer and industrial markets, depending on the product. However, because of the relative isolation of the Prairies, fabricating and processing industries are more likely to be oriented to the local Prairie industrial and consumer markets. The market for service industries is related more specifically to growth of Saskatchewan communities.

Thus, all industrial development in Saskatchewan will be intimately associated with the growth of the Prairie market. In turn, the growth of consumer and industrial demand in this market will depend almost exclusively on industrial growth. The portion of labor employed in agriculture is expected to decline; thus any net population growth in the Prairie region will be as a result of added employment in other segments of the economy, notably resource-based industries such as mining and forestry, manufacturing or secondary industries, and service industries. Therefore, the potential Prairie market which might be served by Prairie industries is directly related to the establishment of these same industries. Ideally, the question to be answered before predicting the size of the market is how much primary and secondary industry can be expected to develop and what employment and income will this development generate. Since prediction of specific primary and secondary industrial development is hazardous, the current Prairie market pattern and predictions of population growth in the Prairie Provinces was reviewed, and the implications of these predictions considered in terms of the potential industrial and consumer market.

Current Prairie Market--1958

Consumer Market

The 1957 estimate of population in the Prairie Provinces is approximately 2.9 million, with an average per capita income of $1,286, making an aggregate income of about $3.728 billion (see Table 17).

From the point of view of distribution costs of a potential Saskatchewan industry, the dispersion of the consumer market is important. The average population density of the three provinces is 4.2 persons per square mile; however, 25.5 percent of the total area is inhabited by 83.6 percent of the people. Thus, population density in the area

Table 17

POPULATION, AVERAGE INCOME, AND TOTAL INCOME
IN THE THREE PRAIRIE PROVINCES AND CANADA
1957

	Alberta	Manitoba	Saskatchewan	Total Prairies	Total Canada
Population	1,160,000	860,000	879,000	2,899,000	16,589,000
Population as a Percent of Canadian Population	7.0%	5.2%	5.3%	17.5%	100%
Per Capita Income	$1,379	$1,327	$1,123	$1,286	$1,395
Relation of per Capita Income to Canadian Average	98.8%	95.1%	80.5%	92.2%	100%
Aggregate Income (millions)	$1,599.6	$1,141.2	$ 987.1	$3,727.9	$23,141.6
Aggregate Income as a Percent of Canada	6.9%	4.9%	4.3%	16.1%	100%

Sources: National Accounts Income and Expenditure, 1926-1956, 1955-1959, D.B.S. "Estimated Population of Canada by Provinces as of June 1, 1957," D.B.S.

inhabited by 83.6 percent of the people is 13.7 persons per square mile; in addition, 51.4 percent of the Prairie population was urban in 1956.

The concentration of population in urban centers is shown in Table 18, and the size and location of the main Prairie cities and the primary Prairie market area are shown in Figure 22. Advances in rural electrification and transportation facilities have had a considerable influence on the type of goods required by consumers in the rural areas. It is nevertheless true that the rural market for certain of the durable goods is not as well developed as the urban market. This therefore represents a potential for the future.

The retail market in relation to population in the Prairie Provinces has been consistently higher than in Canada as a whole. For instance, in 1957, the per capita retail trade in the Prairie Provinces was 8 percent above the national average (see Table 19).

Per capita retail trade in the Prairie Provinces has been consistently higher than that of Canada as a whole, in spite of the greater variability of personal income in the Prairie Provinces. Fluctuations in personal income are substantially smoothed out when translated in terms of the retail market. As Table 20 shows, per capita personal income for Canada has with one exception climbed steadily year by year since the end of World War II, but in the Prairie Provinces per capita personal income has shown a decline in five of the thirteen years shown on the table.

Per capita personal income in the Prairie Provinces has also shown wide year-to-year variations. In 1951 there was an increase of 33 percent over the preceding year and in 1954 a decline of 16 percent from the preceding year; for all of Canada the corresponding variations were 12 percent and 2 percent, respectively. On the other hand, there has been only one downward fluctuation in retail sales in the Prairie Provinces in the postwar period. This was the 1954 decline of 6 percent per capita retail trade from the preceding year, which compares with the decline of 16 percent in personal income in the same year.

Industrial Market

The most important single industry in the Prairie Provinces is still agriculture. Accordingly, it is the largest single market for production equipment and supplies, with heavy emphasis on motorized equipment. In consequence of agriculture's dominant position, the processing of food and beverages is the most important manufacturing industry in the Prairie Provinces, both in terms of value added and people employed.

Table 18

CONCENTRATION OF POPULATION IN URBAN CENTERS IN
THE PRAIRIE PROVINCES
1956

	Alberta	Saskatchewan	Manitoba	Total Prairie
Metropolitan Areas over 200,000				
Number	1	--	1	2
Population	226,002	--	255,093	481,095
Metropolitan Areas 100,000-200,000				
Number	1	--	--	1
Population	181,780	--	--	181,780
Cities 50,000-100,000				
Number	--	2	--	2
Population	--	162,613	--	162,613
Cities 25,000-50,000				
Number	1	1	2	4
Population	29,462	29,603	45,353	104,418
Cities 10,000-25,000				
Number	3	1	3	7
Population	49,121	20,366	45,555	115,042
Towns 5,000-10,000				
Number	3	6	3	12
Population	18,336	45,817	21,915	86,068
Other Urban Areas				
Number	n.a.	n.a.	n.a.	n.a.
Population	131,123	63,604	142,667	337,394
Total Urban Population	635,824	322,003	510,583	1,468,410
Total Population	1,123,116	880,665	850,040	2,853,821
Urban Population as a Percent of Total	56.6%	36.6%	60.1%	51.4%

Source: Census of Canada, 1956, Bulletins 1-7 and 1-22.

FIG. 22

PRIMARY PRAIRIE MARKET AREA AND MAJOR CENTERS OF POPULATION
- 1957 -

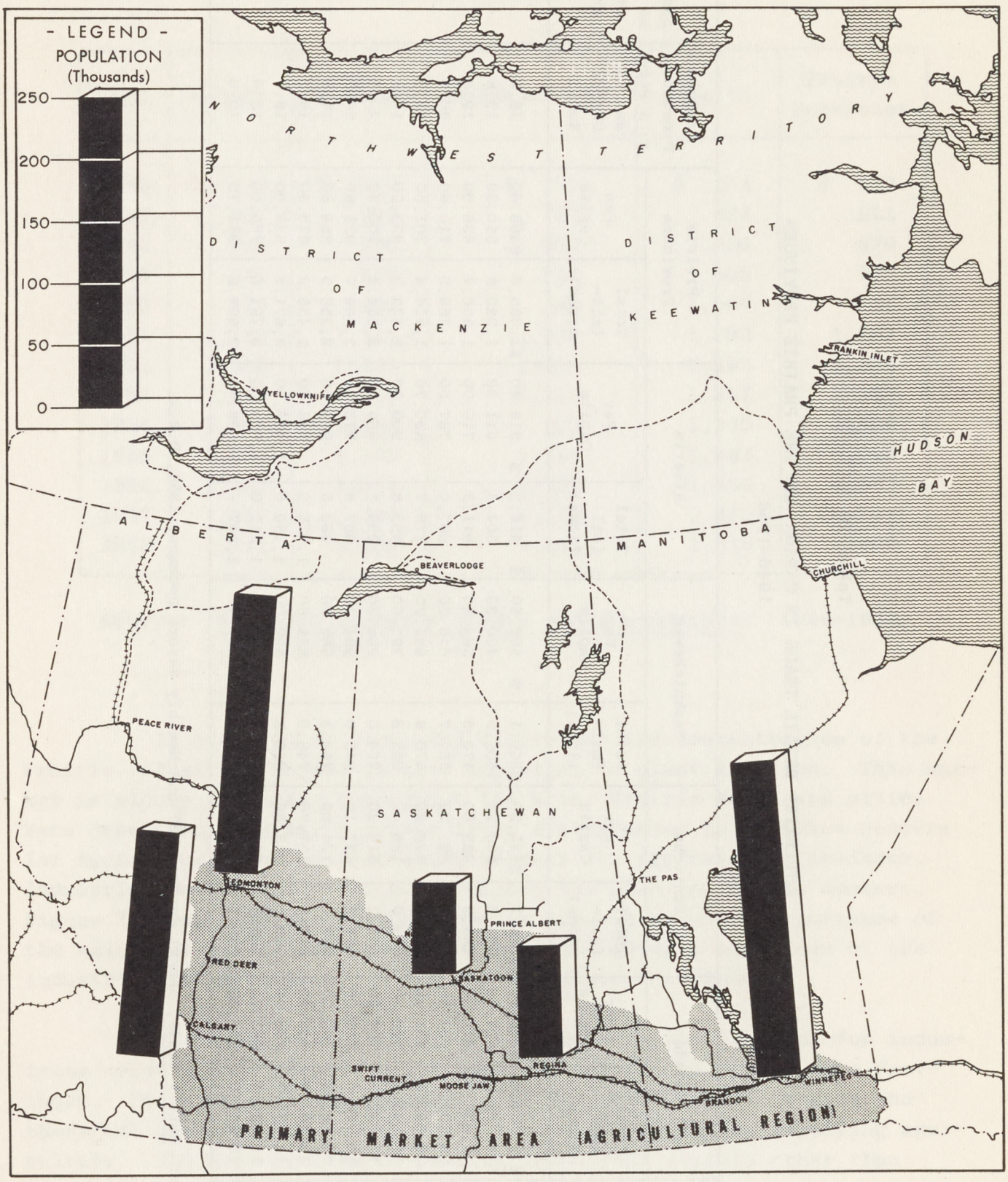


Table 19

ESTIMATED RETAIL TRADE IN CANADA AND THE PRAIRIE PROVINCES
1946-1958

Year	Canada		Manitoba		Saskatchewan		Alberta		Prairie Provinces		Prairie Provinces as a Percent of Canada Total	Saskatchewan as a Percent of Prairie Provinces
	Total (millions)	Per Capita	Total (millions)	Per Capita	Total (millions)	Per Capita	Total (millions)	Per Capita	Total (millions)	Per Capita		
1946	$ 5,787.4	$470.80	$338.2	$465.20	$341.1	$ 409.50	$ 416.3	$ 518.40	$1,095.6	$463.60	18.9%	31.1%
1947	6,963.4	554.80	406.6	550.20	409.9	490.30	504.3	611.30	1,320.8	550.30	19.8	31.0
1948	7,835.0	611.00	465.9	623.60	473.3	564.80	611.5	716.00	1,550.7	636.00	19.8	30.5
1949	8,532.0	634.50	523.3	691.30	537.7	646.30	697.0	787.60	1,758.0	710.60	20.6	30.6
1950	9,617.2	701.40	566.9	738.20	570.8	685.20	776.7	850.70	1,914.4	761.50	19.9	29.8
1951	10,693.1	763.30	609.9	786.00	658.6	791.60	853.8	909.30	2,122.3	833.20	19.8	30.0
1952	11,532.1	797.60	651.3	816.20	764.0	906.30	939.1	965.20	2,354.4	900.70	20.4	32.4
1953	12,128.0	817.00	677.2	837.10	845.0	981.40	987.5	975.80	2,509.7	935.80	20.7	33.7
1954	12,065.8	789.30	637.0	774.00	758.3	868.60	963.6	911.60	2,358.9	856.80	19.6	32.1
1955	13,111.9	835.20	669.3	797.70	748.0	851.90	1,035.0	948.70	2,452.3	873.30	18.7	30.5
1956	14,297.7	889.10	700.1	823.60	812.3	922.00	1,159.0	1,032.00	2,671.4	936.00	18.7	30.4
1957	14,826.4	893.70	725.8	844.00	854.8	972.50	1,211.0	1,044.00	2,791.6	963.00	18.8	30.6
1958	15,252.0	894.60	755.4	868.30	901.7	1,015.40	1,247.7	1,038.90	2,904.8	981.70	19.0	31.0

Source: Retail Trade, Annual Report 1957 and Monthly Report December 1958, D.B.S.

Table 20

PERSONAL INCOME PER CAPITA IN
CANADA AND THE PRAIRIE PROVINCES
1946-1958

Year	Canada	Manitoba	Saskatchewan	Alberta	Prairie Provinces
1946	$ 791	$ 817	$ 770	$ 854	$ 813
1947	827	828	758	884	823
1948	928	980	927	1,030	979
1949	940	958	957	1,008	975
1950	979	983	849	1,007	947
1951	1,130	1,135	1,329	1,308	1,262
1952	1,203	1,170	1,434	1,365	1,328
1953	1,235	1,166	1,319	1,357	1,287
1954	1,205	1,126	927	1,239	1,106
1955	1,257	1,191	1,164	1,292	1,222
1956	1,361	1,325	1,392	1,456	1,397
1957	1,388	1,306	1,146	1,415	1,301
1958	1,431	1,425	1,245	1,518	1,409

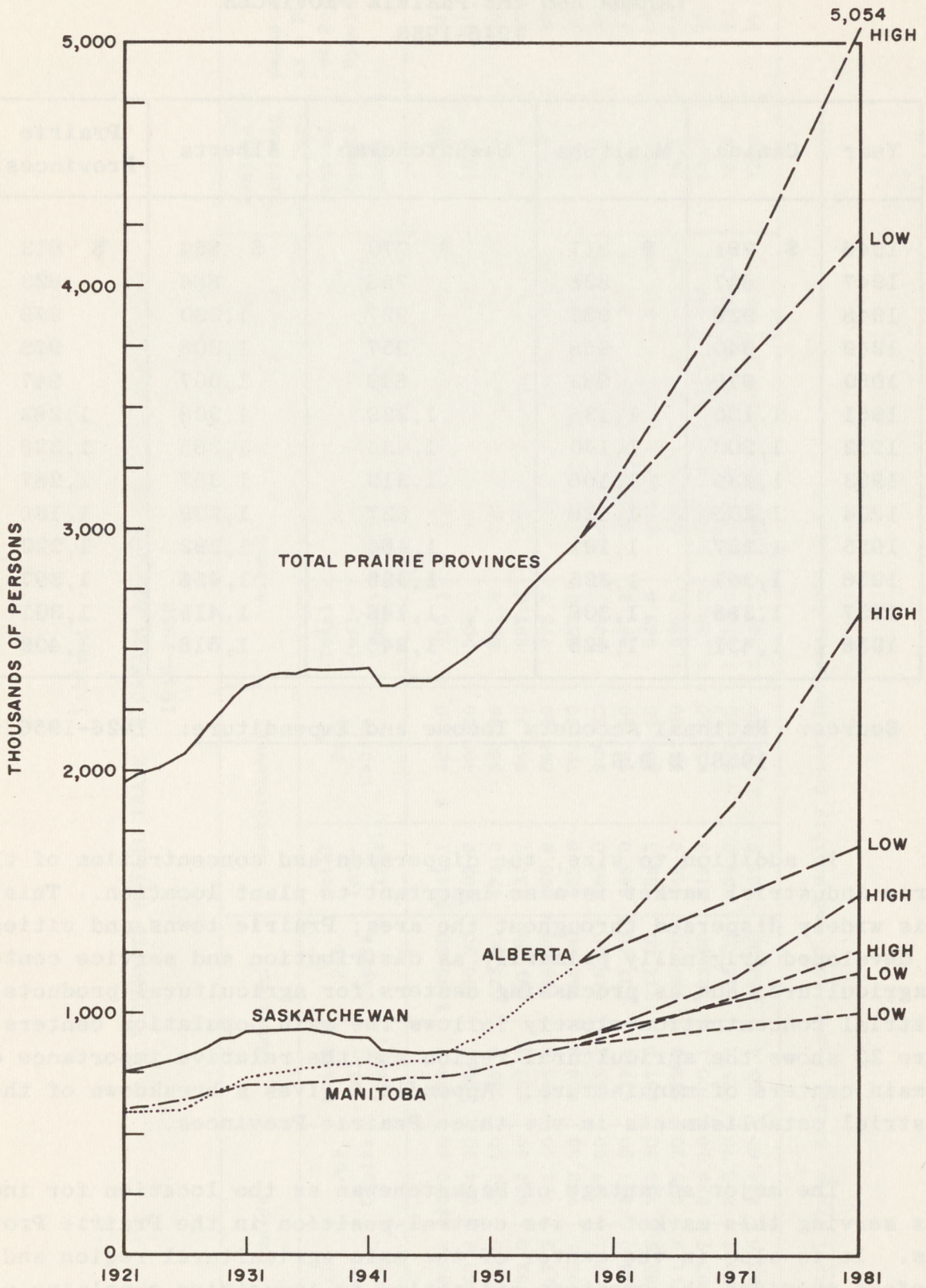
Source: National Accounts Income and Expenditure: 1926-1956, 1958, D.B.S.

In addition to size, the dispersion and concentration of the Prairie industrial market is also important to plant location. This market is widely dispersed throughout the area; Prairie towns and cities were developed originally primarily as distribution and service centers for agriculture, and as processing centers for agricultural products. Industrial concentration closely follows the main population centers. Figure 23 shows the agricultural region and the relative importance of the main centers of manufacture. Appendix A gives a breakdown of the industrial establishments in the three Prairie Provinces.

The major advantage of Saskatchewan as the location for industries serving this market is its central position in the Prairie Provinces. It is also in the center of the main agricultural region and therefore provides the greatest attraction to industries supplying agriculture. The main problem of serving industrial markets other than

FIG. 23

POPULATION OF THE PRAIRIE PROVINCES
1921-58 WITH PROJECTIONS TO 1981



SOURCE: D.B.S. Projections by ERC.

agriculture, as well as consumer markets, from Saskatchewan is that most of the concentrations of manufacturing industries are in Alberta or Manitoba (see Figure 22), as are most of the concentrations of population making up the Prairie consumer market. However, the importance of this disadvantage varies with the product and distribution pattern of the specific industry.

Potential Prairie Market

In considering the potential Prairie market is is necessary to take into account both future population and per capita income trends. Figure 23 shows the population projections of the three Prairie Provinces to 1981.[1/] In each case a low and a high projection is given. It is

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1/ Although various methods have been developed to assist in predicting the future population of a region, in the last analysis forecasting is a matter of judgment. The principal task of the forecaster is to make sure that his judgment is based on all information available about trends and factors affecting population in the district with which he is concerned. In the past, population forecasting has been hazardous, since it has relied very heavily on patterns of development in a district and these patterns have seldom held over a long period of time. Thus, forecasts of population growth for the 1930's based on the growth of the 1920's were too large, and forecasts of growth in the 1940's based on the 1930's were too small. The problems are multiplied when the forecasts must be made for periods far into the future. Extraordinary events, such as a discovery of a nearby oil field, the sudden development of a new industry--or the accelerated or decelerated development of a military installation--upset all calculations of future growth.

Methods of projecting population are of two major categories: one extrapolates the population by means of mathematical formulas utilizing historical data, the second constructs a projection from separate forecasts of the components of population--births, deaths, and migration. All methods of projection depend on the thesis that factors governing the size and composition of the population change slowly and with sufficient regularity so that trends can be applied to the future.

expected that the Prairie population in 1981 will show an increase over 1958 population of from 40 to 70 percent. During this period it is expected that the total rural population will show an absolute decline of about 15 to 20 percent. Thus, the total population projections imply an increase in urban population of between 100 and 200 percent. As a result of this projected redistribution of population, it is expected that agriculture's share of provincial net output will decline from the current 40 percent to 25 or 30 percent by 1981.

In Saskatchewan the same general trend is expected in urban population, although the total population increase in the province may not be up to the Prairie average because of the current high percentage of population in rural areas (which is expected to decline).

Population growth within the Prairie region has not been uniform: there has been a pronounced tendency since the thirties for the fringes to grow more rapidly than the center. For instance, in the period 1931-46 the population of Saskatchewan declined at an average annual rate of 0.6 percent, while that of Alberta increased at an average annual rate of 0.6 percent and that of Manitoba, 0.3 percent.[1/] Similarly, for the period 1946-56, Saskatchewan showed an average annual rate of increase of 0.6 percent as compared with 1.6 percent for Manitoba and 3.4 percent for Alberta. However, recent indications are that Saskatchewan's rate of population growth is accelerating. In the period June 1, 1958 to June 1, 1959, the rate of growth was 1.6 percent.

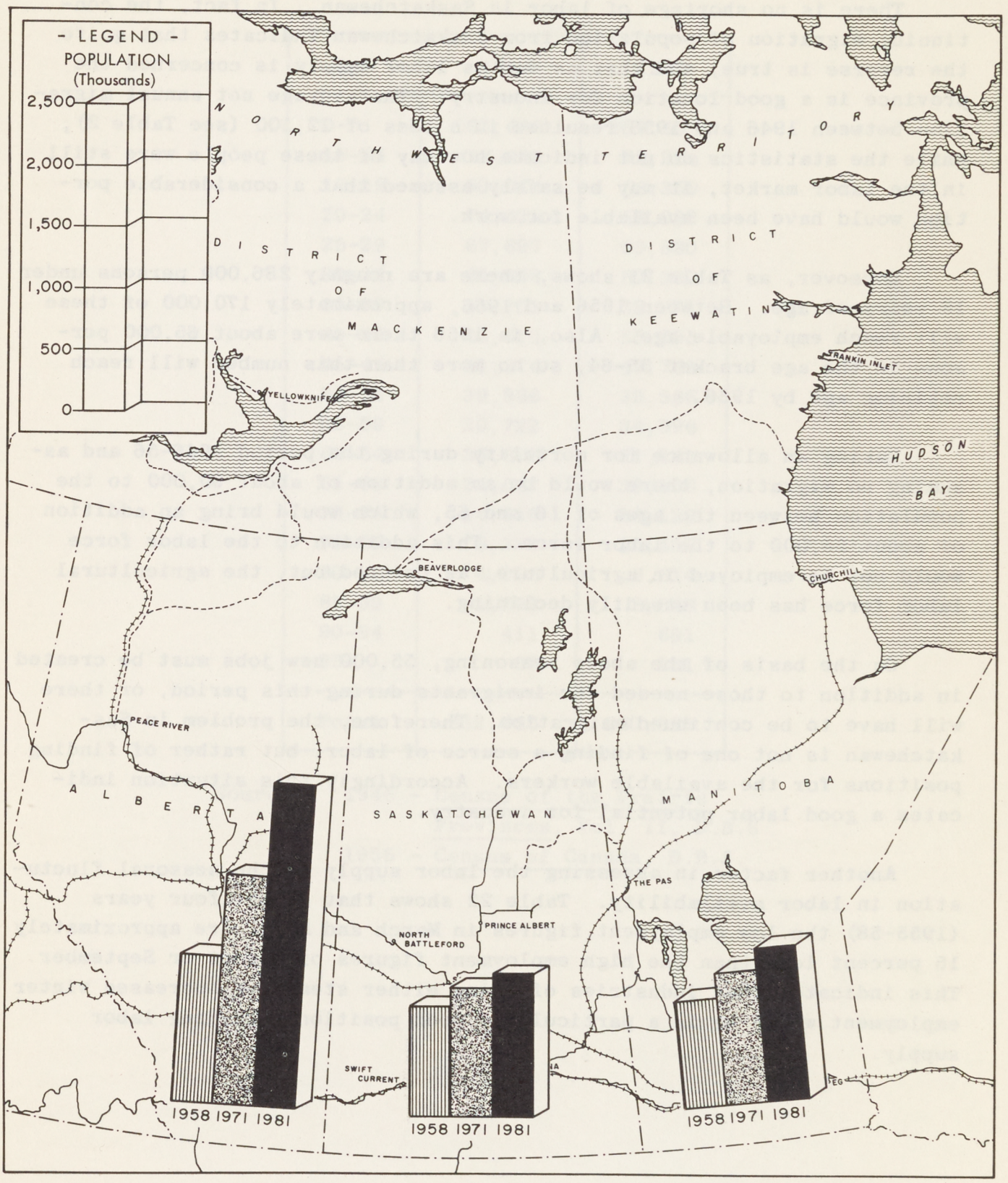
Figure 24 shows the expected pattern of population distribution in the Prairie Provinces. Since there appears to be no reason to expect that per capita income will vary markedly between provinces, it is assumed that population distribution is a good indication of the relative importance of those provinces in the Prairie market.

Increases in per capita real income are a function of a number of factors, improved technology, economies of scale, and the market situation. The latter will be particularly important in determining the amount of personal income accruing from agriculture. Increases in productivity vary considerably with region and type of industry; however, in the case of the Prairie region, a figure of 1 percent per year (over the 1959 level of output per unit of input) seems reasonable. If this figure is assumed, then total purchasing power in the Prairie region in 1981 is expected to increase by approximately 60 to 100 percent over that for 1958--to between $2.04 billion and $2.57 billion by 1981.

1/ Population basis June 1 of each year.

FIG. 24

DISTRIBUTION OF PROJECTED POPULATION IN THE PRAIRIE PROVINCES
1958, 1971, AND 1981



Labor

Availability

There is no shortage of labor in Saskatchewan. In fact, the continuing migration of population from Saskatchewan indicates that quite the reverse is true, and that as far as labor supply is concerned the province is a good location for industry. The average net annual migration between 1946 and 1956 resulted in a loss of 12,100 (see Table 2); while the statistics do not indicate how may of these people were still in the labor market, it may be safely assumed that a considerable portion would have been available for work.

Moreover, as Table 21 shows, there are roughly 286,000 persons under 15 years of age. Between 1956 and 1966, approximately 170,000 of these will reach employable age. Also, in 1956 there were about 65,000 persons in the age bracket 55-64, so no more than this number will reach retiring age by 1966.

Making an allowance for mortality during the period 1946-56 and assuming no migration, there would be an addition of about 90,000 to the population between the ages of 16 and 65, which would bring an addition of about 55,000 to the labor force. This addition to the labor force would not be employed in agriculture; as pointed out, the agricultural labor force has been steadily declining.

On the basis of the above reasoning, 55,000 new jobs must be created in addition to those needed for immigrants during this period, or there will have to be continued emigration. Therefore, the problem in Saskatchewan is not one of finding a source of labor, but rather of finding positions for the available workers. Accordingly this situation indicates a good labor potential for industry.

Another factor in assessing the labor supply is the seasonal fluctuation in labor availability. Table 22 shows that in the four years (1955-58) the low employment figures in March and April are approximately 15 percent less than the high employment figures of August or September. This indicates that industries offering either steady or increased winter employment would be in a particularly good position regarding labor supply.

Table 21

AGE DISTRIBUTION OF SASKATCHEWAN POPULATION
1946 and 1956

Age	1946	1956
0-9	162,446	207,556
10-14	78,643	79,214
15-19	80,944	68,359
20-24	74,821	58,992
25-29	67,697	59,880
30-34	60,598	60,302
35-39	53,701	59,371
40-44	44,615	55,255
45-49	41,374	47,765
50-54	39,966	39,586
55-59	39,722	34,596
60-64	33,836	31,143
65-69	24,647	30,108
70-74	14,939	24,127
75-79	8,372	14,407
80-84	4,096	6,614
85-89	1,773	2,548
90-94	411	691
95+	87	151
Total	832,688	880,665

Sources: 1946 - Census of the Prairie Provinces, Vol. II, D.B.S.
1956 - Census of Canada, D.B.S.

Table 22

INDEX OF EMPLOYMENT IN SASKATCHEWAN
IN THE NONAGRICULTURAL INDUSTRIES
(Employers with 15 or more Employees)
1955-1958

Index: 1949 = 100

Month	1955	1956	1957	1958
January	115.8	113.3	120.7	121.0
February	107.8	107.9	113.6	114.4
March	106.7	107.1	112.6	113.1
April	106.1	108.3	112.6	114.3
May	108.7	111.9	115.7	119.5
June	117.4	122.4	126.7	129.5
July	122.7	127.6	132.3	133.8
August	125.7	130.7	136.9	135.9
September	126.3	131.0	137.0	137.2
October	123.9	129.7	134.7	135.9
November	124.2	128.7	132.1	132.8
December	121.6	126.6	128.1	130.1

Source: Employment and Payrolls, December 1958, D.B.S.

A feature of Saskatchewan's population is the absence of any concentration in a metropolitan area. It has already been indicated that the urban portion of the population has been growing, but even the largest city, Regina, as yet accounts for only a little more than 11 percent of the total population. Moreover, it appears that since 1946 the trend toward an increasing portion of urban population in the nine largest cities has levelled off (see Table 23).

This indicates that any potential industry would have a comparatively wide selection of sites if the availability of an adequate labor supply is the prime consideration. Moreover, because of the high number of motor vehicles per capita in the province (see Table 24), and rapidly improving highway facilities, a plant should have no difficulty in drawing labor from a 20- to 30-mile radius.

Table 23

POPULATION OF NINE MAJOR CITIES OF SASKATCHEWAN
1926-1956

	1926	1931	1936	1941	1946	1951	1956	1959 (Estimates)
Total Province	820,738	921,785	931,547	895,992	832,688	831,728	880,665	902,000
Urban	242,532	290,905	280,273	295,146	208,872	252,470	322,003	n.a.
Rural	578,206	630,880	651,274	600,846	623,816	579,258	558,662	n.a.
Estevan	2,336	2,936	2,854	2,774	3,120	3,935	5,264	8,700
Moose Jaw	19,039	21,299	19,805	20,753	23,069	24,355	29,603	31,800
North Battleford	4,787	5,986	4,719	4,745	5,717	7,473	8,924	10,200
Prince Albert	7,873	9,905	11,049	12,508	14,532	17,149	20,366	23,000
Regina	37,329	53,209	53,354	58,245	60,246	71,319	89,755	100,000
Saskatoon	31,234	43,291	41,734	43,027	46,028	53,268	72,858	85,000
Swift Current	4,175	5,296	5,074	5,594	6,379	7,458	10,612	11,800
Weyburn	4,119	5,002	5,338	6,179	7,003	7,148	7,684	8,500
Yorkton	4,458	5,027	4,931	5,577	5,714	7,074	8,256	8,600
Nine Cities as Percent of Urban Population	48%	52%	53%	54%	82%	79%	79%	n.a.

Sources: Census of Canada and Census of the Prairie Provinces, D.B.S. Estimates by Economic Advisory and Planning Board, Government of Saskatchewan.

Table 24

MOTOR VEHICLES PER CAPITA IN PRAIRIE PROVINCES
1957

	Passenger Automobiles	Total Vehicles
Saskatchewan		
1957	0.21	0.34
1958	.22[1/]	.36[1/]
Alberta	.24	.35
Manitoba	.21	.28
Total Prairie Provinces	.22	.33
Canada	0.20	0.27

Source: The Motor Vehicle, 1957, D.B.S.

Labor Costs

Labor costs are important to the location of all industry, but particularly of those industries where labor cost is a high proportion of production costs. In such cases, a company's competitive position may be largely determined by this item. Resource-based industries and ancillary industries will not be materially influenced by labor costs. However, this factor weighs heavily with industries that supply the consumer market in Saskatchewan and the Prairie Provinces, as they have a choice of location in the Prairie region which is governed by factors other than raw materials. Wages do give some index of regional differences in labor costs. However, in making a complete appraisal of these costs a number of other variables must be taken into account. The first is fringe benefits, such as unemployment insurance, workmen's compensation, vacations, overtime allowances, sick leave, retirement, and life insurance. Other variables are productivity of labor, turnover of staff, and absenteeism.

1/ Estimated.

Wages

Since 1946 average hourly earnings for manufacturing industries in Saskatchewan have been consistently higher than those for Canada as a whole, although only by a very slight margin up to 1953. However, since 1953, this margin has been widening and was seven cents per hour in 1957 (see Table 25).

As far as the Prairie region is concerned, average hourly earnings in manufacturing are about the same level in Alberta as in Saskatchewan, but these two provinces are 12 percent higher than Manitoba. Thus, for labor-intensive industries, Manitoba has a competitive advantage in wages over the other two Prairie Provinces.

In the postwar period average weekly wages and salaries in manufacturing in Saskatchewan have risen above the industrial average, although wages and salaries in construction have risen still more rapidly and have exceeded manufacturing wages and salaries since 1952.

The sharp increase in wages shown in Table 26 (in constant dollars) may be attributed largely to the type of industry that has developed in the province during the postwar period and particularly since 1952--a type that uses more capital equipment and more efficient production methods than prewar industries.

Fringe Benefits

Another of the factors that influence labor cost is working conditions, as set down either by legislation or union contracts. The costs associated with these conditions do influence a company's production costs and therefore regional differences are considered in plant location decisions.

Of significance to the labor market are several legislative provisions, such as those regarding minimum age for employment, minimum wages, and maximum hours of work. In practically all these categories Saskatchewan has generally set a higher standard of protection for employees than most other provinces. For instance, the minimum age for employment in Saskatchewan is 16 years of age for factories, hotels and restaurants, and coal mines and metal mines aboveground, and 18 years of age for metal mines below ground.

Legislation in Saskatchewan prescribes two weeks' vacation with pay after one year's service. The only other province with such a

Table 25

HOURLY WAGE RATES IN MANUFACTURING INDUSTRIES
IN ALBERTA, SASKATCHEWAN, MANITOBA, AND CANADA
1945-1957

Year	Alberta[1/]		Saskatchewan		Manitoba		Canada	
	Average No. of Hours per Week	Average Hourly Earnings	Average No. of Hours per Week	Average Hourly Earnings	Average No. of Hours per Week	Average Hourly Earnings	Average No. of Hours per Week	Average Hourly Earnings
1945	43.2	$0.716	42.8	$0.676	43.2	$0.681	44.3	$0.694
1946	42.1	0.722	42.0	0.699	42.3	0.709	42.7	0.700
1947	42.1	0.796	41.8	0.805	42.0	0.792	42.5	0.803
1948	42.2	0.914	41.4	0.922	42.3	0.887	42.2	0.913
1949	42.1	1.001	41.6	1.000	42.2	0.955	42.3	0.986
1950	41.7	1.039	41.4	1.051	41.8	0.994	42.3	1.036
1951	41.0	1.166	41.0	1.174	41.4	1.125	41.8	1.168
1952	40.5	1.300	41.2	1.296	40.8	1.229	41.5	1.292
1953	40.2	1.397	40.7	1.365	40.3	1.314	41.3	1.358
1954	40.0	1.460	40.4	1.447	40.2	1.351	40.6	1.408
1955	40.1	1.508	40.4	1.504	40.2	1.374	41.0	1.445
1956	40.1	1.561	40.0	1.564	40.5	1.431	41.1	1.515
1957	40.0	1.672	39.9	1.669	40.1	1.495	40.4	1.600

1/ Includes Northwest Territories.

Source: Review of Man-Hours and Hourly Earnings, 1946-1957, D.B.S.

Table 26

AVERAGE WEEKLY WAGES AND SALARIES IN SASKATCHEWAN
BY INDUSTRY
1947-1957

Industry	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Manufacturing	$34.20	$38.61	$42.03	$43.59	$47.87	$52.45	$55.25	$57.95	$60.01	$61.99	$65.82
Food and beverages	33.74	38.06	41.45	43.50	47.67	51.24	53.37	55.74	57.70	59.27	62.04
Meat products	36.76	42.25	47.45	49.78	55.33	61.25	60.98	63.88	67.17	69.77	71.95
Dairy products	28.93	33.01	35.51	37.91	40.81	42.21	44.68	46.66	47.98	49.16	51.29
Construction	33.75	36.99	39.73	42.44	45.81	53.90	58.30	59.87	60.61	65.26	72.84
Building and general engineering	33.33	36.14	38.58	40.44	44.46	55.25	59.31	58.85	59.04	66.20	75.66
Highways, bridges, and streets	34.10	37.64	40.75	40.14	47.25	52.19	56.42	61.11	62.35	64.20	69.13
Transportation, Storage, Communications	40.97	45.28	47.90	48.41	52.29	54.94	60.77	60.79	61.94	64.47	67.48
Steam railways	45.72	50.82	53.59	53.04	57.19	59.04	65.37	66.27	67.41	70.37	72.58
Storage	32.40	34.74	37.09	39.30	43.06	46.09	53.96	49.63	50.11	50.41	55.96
Trade	31.22	34.32	36.80	38.53	42.22	46.20	48.17	50.66	52.67	55.17	57.36
Wholesale	34.65	37.67	40.62	42.56	46.71	50.90	53.44	55.82	59.24	62.13	65.43
Retail	29.06	32.27	34.38	36.02	39.40	42.72	44.28	46.99	48.35	50.78	52.56
Finance, Insurance, and Real Estate	33.97	32.32	37.58	38.84	39.93	42.31	44.17	46.13	48.37	52.70	55.40
Service	23.61	25.30	26.97	28.01	29.27	31.99	33.83	35.47	36.04	37.13	38.26
Industrial Composite	35.35	38.76	41.50	42.86	46.68	50.90	54.54	56.09	57.88	61.26	65.06

Source: Review of Employment and Payrolls, D.B.S., annual reports.

provision is British Columbia. In addition, three weeks' vacation with pay after five years' service is prescribed, a legislative provision unique to Saskatchewan. The minimum standards set by these legislative provisions naturally may be exceeded as a result of collective bargaining. Table 27 shows prevailing conditions of work in Canada and the three Prairie Provinces.

Alberta and Manitoba provide for one week's holiday with pay after one year's service, and two weeks after two years' service in Alberta and after three years' service in Manitoba.

Saskatchewan legislative provisions for time and one-half pay after 8 hours per day and 44 hours per week for factory workers are matched only by British Columbia; by Alberta in the four largest cities; and by Manitoba in the case of women. Manitoba provides for overtime pay after 8 hours per day and 48 hours per week for male factory workers, and Alberta makes this provision for both men and women outside the four largest cities.

However, the standard hours of work per week are substantially below these legislative limits. In 1958, 72.2 percent of plant employees in manufacturing in Saskatchewan worked in establishments where the standard hours of work per week were 40 hours or under, as compared with 70.2 percent in Manitoba, 70.3 percent in Alberta, and 70.1 percent in all of Canada. The five-day week is less firmly established for manufacturing establishments in Saskatchewan than it is for Canada as a whole. In 1958, although 88.3 percent of plant employees in manufacturing for Canada as a whole worked in establishments where the five-day week was the standard, only 76.4 percent of employees in Saskatchewan were in that position as compared with 79.5 percent in Manitoba and 70.8 percent in Alberta (see Table 27).

Saskatchewan's legislation regarding workmen's compensation for industrial accidents is essentially the same as that of other provinces. All provinces in Canada have a workmen's compensation law providing benefits that are relatively the same throughout Canada. During the period of temporary disablement, payments to the workman are made on the basis of 75 percent of average earnings and awards for permanent disability are made on the same basis. The Workmen's Compensation Board of the Department of Labour each year assesses and levies on employers in the province an amount sufficient to pay expenses of administering the accident fund and compensation for the current year, as laid down in the Workmen's Compensation Act. The assessment is made on the basis of a percentage of the payroll.

The minimum wage is higher in Saskatchewan than in other Canadian provinces except British Columbia. The British Columbia minimum of 75 cents per hour for male factory workers is higher than the $30 per

Table 27

PERCENT OF EMPLOYERS IN ALL MANUFACTURING PLANTS AFFECTED BY PREVAILING STANDARDS OF HOURS OF WORK, PAID HOLIDAYS, AND OVERTIME RATES
April 1958

Standards	Manitoba	Saskatchewan	Alberta	Canada
Standard Hours per Week				
Under 40 hours	2.9%	6.9%	4.4%	2.6%
40 hours	67.3	65.3	65.9	67.5
Over 40 hours	29.8	27.8	29.7	29.8
On a 5-day week	79.5	76.4	70.8	88.3
Vacations With Pay				
Two weeks	99.2	97.5	99.0	95.4
After: less than 3 years	50.2	97.0	96.6	36.7
3 years	44.2	0.3	2.0	28.3
more than 3 years	4.8	0.2	0.4	30.4
Three weeks	59.6	85.4	67.8	72.6
After: less than 15 years	7.9	74.0	14.8	15.1
15 years	39.0	11.4	52.2	49.7
more than 15 years	12.7	--	0.8	7.8
Four weeks	5.7	12.0	12.7	14.6
After: 25 years	2.0	6.0	5.0	10.8
other	3.7	6.0	7.7	3.8
Paid Statutory Holidays				
1-7	21.5	2.9	11.0	26.9
8	48.0	62.6	49.1	52.3
9	10.8	27.0	27.1	14.4
More than 9	16.5	2.6	9.5	3.1
Overtime Rates				
Time and one-half	81.5	95.7	97.9	92.2
Other rates	16.5	3.2	1.4	6.3
No information or no payment	2.0	1.1	0.7	1.5

Source: Working Conditions in Canada, 1958, Department of Labour.

week minimum set for the cities and 15 larger towns in Saskatchewan and the $29 per week minimum for other centers in the province. The Alberta minimum wage provisions for male factory workers (in all centers with populations of over 5,000) are essentially the same as provisions in Saskatchewan, although the minimum wage for female factory workers in both Alberta and British Columbia is lower than that in Saskatchewan. Manitoba's minimum wage of 58 cents per hour in cities and 54 cents per hour in rural areas for female factory workers, and 60 cents per hour for male factory workers in both cities and rural areas are also lower than those in Saskatchewan.

Although minimum wages in Saskatchewan exceed those in other provinces in practically all the above categories, it is of interest to note that employers pay proportionately less toward the cost of industrial pensions and hospital and medical plans in Saskatchewan than in other provinces (see Table 28). The relatively low proportion (35.7 percent) of plant employees in manufacturing in Saskatchewan working in establisments where employers make a contribution to hospitalization plans is accounted for by the provincial hospitalization plan, which has been in effect since 1947. The establishment of similar plans in 1958 in Manitoba and Alberta will have the effect of reducing employer participation in hospitalization plans in these privinces also.

The Saskatchewan Department of Labour, which was established in 1944, is responsible for administering the various legislative provisions regarding working conditions which have already been referred to. Authority to set minimum wages is vested in the Minimum Wage Board of the Department of Labour. Provision is made for the Minister of Labour to authorize maximum hours of work--a nine-hour day, forty-hour week where the five-day week is established--and conditional exemptions--as in the case of employees paid overtime after 48 hours per week--may be granted by order-in-council (see Table 29).

From the discussion above it can be seen that Saskatchewan labor legislation is strongly oriented to worker-protection. However, it is considered that such legislation is in no way out of line with the trends evident in other parts of the continent, although it is somewhat more advanced.

Productivity

There has been considerable increase in productivity of Saskatchewan manufacturing labor largely as a result, particularly since 1952, of the substitution of capital for labor. During the postwar

Table 28

PERCENT OF EMPLOYEES IN ALL MANUFACTURING PLANTS
WHOSE EMPLOYERS CONTRIBUTE TO PENSION, INSURANCE, AND MEDICAL PLANS
April 1958
(Percent)

Employee Coverage Plans	Manitoba	Saskatchewan	Alberta	Canada
Pension	55.6%	62.6%	72.7%	69.3%
Employer contributes	52.5	59.5	68.3	65.4
Contribution of 50%	31.7	36.0	42.5	28.0
Contribution of 100%	5.8	6.5	10.4	22.7
Group Life Insurance	73.5	91.8	90.4	89.7
Employer contributes	68.2	78.8	81.6	81.7
Contribution of 50%	36.3	41.1	45.8	37.3
Contribution of 100%	9.9	12.7	9.0	17.6
Hospitalization	89.3	35.7	91.1	88.4
Employer contributes	59.9	25.1	67.7	74.7
Contribution of 50%	34.3	22.1	45.0	33.4
Contribution of 100%	4.0	1.0	3.5	15.8
Surgical Benefits	78.3	74.4	89.5	89.7
Employer contributes	58.7	57.7	78.4	79.4
Contribution of 50%	35.2	43.1	53.3	37.6
Contribution of 100%	3.3	5.1	3.8	15.1
Physicians' Services in Hospitals	75.0	66.7	87.8	78.6
Employer contributes	54.0	50.7	69.9	69.1
Contribution of 50%	32.5	38.1	48.8	33.1
Contribution of 100%	3.0	2.8	1.6	12.6
Physicians' Home and Office Calls	72.3	64.2	80.7	51.9
Employer contributes	52.2	47.4	62.8	47.2
Contribution of 50%	32.5	35.9	44.0	23.7
Contribution of 100%	2.1	2.8	1.3	10.0

Source: Working Conditions in Canada, 1958, Department of Labour.

Table 29

LEGAL MAXIMUM HOURS OF WORK IN CANADA BY PROVINCE 1958

	Newfoundland	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Coal Mines									
Aboveground	—	—	—	—	—	—	8,44[1]	8,48	8,44
Below ground	—	8	8	—	—	—	8,44[1]	8,48	8,44
Metal Mines									
Aboveground	—	—	8	—	8,48	8,48 (men)[2]	—	8,48	8,44
Below ground	—	—	8	—	8,48	8,48 (men)[2]	—	8,48	8,44
Factories	—	—	9,54[3]	10,55[3]	8,48[4]	8,48 (men)[2] 8,44 (women)[2]	8,44[1]	8,48 8,44 (4 cities)[5]	8,44
Shops	8,[3] 54 (15 shop-closing areas) 44 (St. John's)	—	—	60[6]	8,48[4]	8,48 (men)[2] 8,44 (women)[2]	8,44[7]	8,48 8,44 (4 cities)[5]	8,44
Offices	8,[3] 54 (15 shop-closing areas)[8] 44 (St. John's)[8]	—	—	—	8,48	8,48 (men)[2] 8,44 (women)[2]	8,44[7]	8,48 8,44 (4 cities)[5]	8,44

1/ These limits apply unless time and one-half is paid. In addition, the Factories Act prohibits employment of women beyond 48 hours in a week. Thus, women in factories must be paid time and one-half if they work beyond 44 hours in a week and they may not work more than 48 hours.

2/ These limits apply unless time and one-half is paid. Women may not work overtime to a greater extent than 3 hours in a day, 12 hours in a week, and 24 hours in a month.

3/ Females and boys under 18.

4/ In case of exemptions under the Hours of Work Act, maximum hours permitted for women and boys under 16 are 10 and 60, the limits set by the Factory, Shop and Office Building Act.

5/ Maximum hours are 8 and 44 in Edmonton, Calgary, Lethbridge, and Medicine Hat.

6/ Females and boys under 18 in towns of 10,000 or more.

7/ These limits apply unless time and one-half is paid. In centers of less than 500 population, time and one-half must be paid after 48 hours in a week.

8/ These limits apply only to offices connected with shops.

Source: Provincial Labour Standards, 1958, Department of Labour.

period, the total number of employees in manufacturing remaind constant for about 12 years, with a sharp increase since 1956. Production as measured in value added by manufacture has almost tripled in terms of current dollars, while wages and salaries have doubled (see Table 30).

Net production in constant dollars per employee has approximately doubled since 1947 and net production per unit of labor cost expressed in current dollars has risen by about 50 percent.

This sharp increase in the value of production is a reflection of heavy capital investment, particularly in the petroleum refining industry with its typically high value of production per employee. Almost certainly it would not indicate a proportional rise in productivity for all manufacturing industries.

Labor-Management Relations

The principal distinguishing feature of labor-management relations in Saskatchewan is the emphasis on the voluntary informal conciliation service provided by the provincial Department of Labour. During the last six or seven years there has been less reliance on formal boards of conciliation and greater reliance on the process of informal conciliation (see Figure 25).

Perhaps one of the most significant trends has been the rapid pace of trade union organization in the province in the last decade (see Table 31). The portion of nonagricultural paid workers with trade union membership has almost doubled in Saskatchewan since 1946, rising from 16 percent to 30 percent, while for Canada as a whole during the same period trade union membership among nonagricultural paid workers rose from 28 percent to 31 percent (see Table 32).

Table 33 shows the affiliation of trade union membership in Saskatchewan. Ninety-one percent of trade union membership in Saskatchewan is affiliated with the Canadian Labour Congress; nationally, 72 percent has this affiliation. This high degree of affiliation with one central labor congress may be regarded as a means of reducing the possibility of jurisdictional disputes as a source of industrial stoppages; in this sense Saskatchewan is in a favorable position.

Table 30

INDICATORS OF EFFICIENCY OF THE MANUFACTURING INDUSTRIES IN SASKATCHEWAN
1947-1958

Year	Total Employees	Total Salaries and Wages		Value Added by Manufacture		Net Production per Employee (constant dollars)[2/]	Net Production per Dollar of Labor Cost (current dollars)
		Current Dollars (thousands)	Constant Dollars[1/] (thousands)	Current Dollars (thousands)	Constant Dollars[2/] (thousands)		
1947	11,723	$19,662	$23,186	$ 41,480	$ 50,340	$4,294	$2.11
1948	10,950	21.039	21,690	45,054	46,209	4,220	2.14
1949	10,841	22,274	22,274	47,357	47,357	4,368	2.13
1950	10,596	23,010	22,362	49,495	46,474	4,385	2.15
1951	11,023	26,290	23,122	61,089	50,445	4,576	2.32
1952	11,307	29,490	25,313	80,934	70,995	6,278	2.74
1953	11,604	32,396	28,048	79,941	71,825	6,189	2.47
1954	11,526	33,510	28,838	104,560	95,575	8,292	3.12
1955	11,490	34,826	29,919	113,599	102,897	8,955	3.26
1956	11,536	36,683	31,061	113,628	99,849	8,655	3.09
1957	12,018	40,083	32,882	119,000	103,776	8,635	2.97
1958	12,500	44,000	35,172	125,000	108,790	8,703	2.84

1/ Total salaries and wages deflated by "consumer price index (1949=100)."
2/ Value added by manufacture (net value) deflated by "general wholesale price index (1949=100)."

Sources: The Manufacturing Industries of Canada, Section E. Prairie Provinces, D.B.S., 1930-1957 annuals. Canadian Statistical Review, 1955 and 1957 supplement, and 1959, Vol. 34, D.B.S. Economic Review, Economic Advisory and Planning Board, Government of Saskatchewan, April 1959.

FIG. 25

LABOR STRIKES AND CONCILIATIONS IN SASKATCHEWAN
1945 - 1957

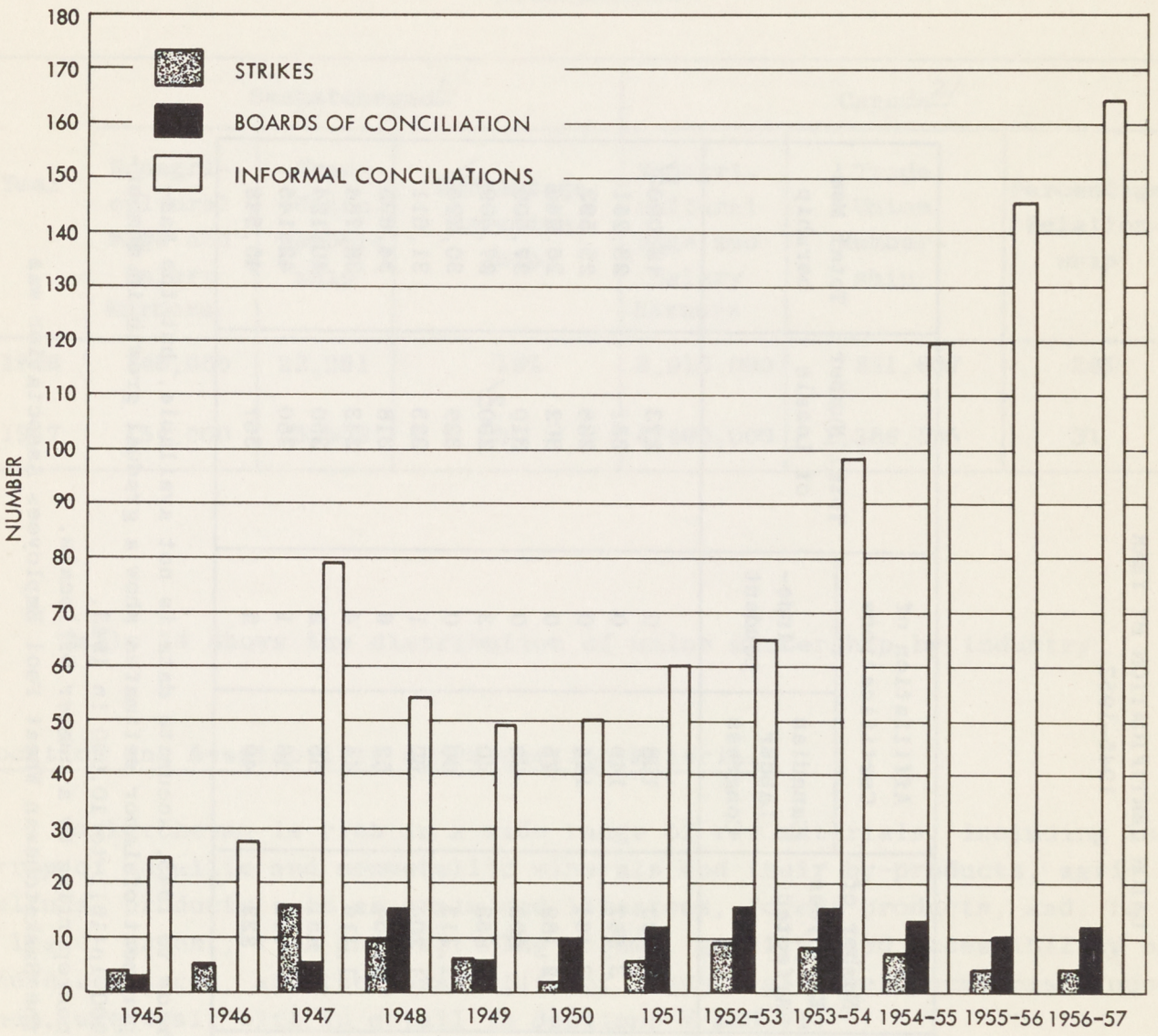


Table 31

UNION CERTIFICATION BY YEAR
1945-1957

Year	Certifications	Number of Employees Affected	Affiliation of Certifications		Total Number of Locals	Total Membership
			Canadian Labour Congress	Independent		
1945	108	6,623	108	0	273	18,000[1/]
1946	149	3,557	149	0	281	23,251
1947	114	3,464	114	0	288	25,593
1948	76	2,189	76	0	302	26,940
1949	69	903	69	0	310	27,509
1950	43	863	40	3	290[2/]	27,609
1951	66	1,313	60	0	329	30,326[3/]
1952	61	1,204	60	1	325	31,611
1953	58	1,254	52	6	318	34,695
1954	48	1,119	44	4	343	38,754
1955	55	851	55	2	350	40,124
1956	57	719	56	1	350	42,145
1957	54	823	49	5	367	45,548

1/ Estimate. Prior to 1945, accurate data is not available, but the Saskatchewan Department of Labor estimates show a gradual growth in membership from 4,000 in 1911 to 10,000 in 1943.

2/ Loss due to nonreporting by a number of locals.

3/ After 1950, the Saskatchewan Wheat Pool Employees Association was included.

Source: Saskatchewan Department of Labour.

Table 32

TRADE UNION MEMBERSHIP IN RELATION TO
PAID AND NONAGRICULTURAL WORKERS
1946 and 1957

Year	Saskatchewan[1]			Canada[2]		
	Nonagricultural Wage and Salary Earners	Trade Union Membership	Percentage Relationship	Nonagricultural Wage and Salary Earners	Trade Union Membership	Percentage Relationship
1946	146,000	23,251	16%	3,010,000	831,697	28%
1957	154,000	45,548	30	4,460,000	1,386,185	31

Table 34 shows the distribution of union membership by industry.

Location and Availability of Production Materials

Saskatchewan is rich in a wide range of raw materials, including an array of metallic and nonmetallic minerals and their by-products, agricultural products such as grain and livestock, forest products, and, to a lesser extent, fish and fur. The volume, quality, and accessibility of these resources, and the possibility of industrial development based upon them, are dealt with in detail in Sections V and VI.

Saskatchewan industries may also utilize raw materials from neighboring provinces, such as the cement plant which imports limestone from Manitoba. However, in general, raw materials not located within the province are unlikely to provide the basis for a Saskatchewan industry.

1/ Source: Saskatchewan Department of Labour.
2/ Source: Federal Department of Labour.

Table 33

UNION MEMBERSHIP AFFILIATION IN SASKATCHEWAN
1957

	Total	Private Industry	Provincial Government	Federal Government	Municipal Government	Co-ops.
Under Provincial Jurisdiction	31,034	12,759	11,703	--	4,429	2,143
Canadian Labour Congress	29,116	11,618	11,703	--	4,429	1,366
Independent	513	513	--	--	--	--
Other associations and groups	1,405	628	--	--	--	777
Under Federal Jurisdiction	14,514	5,682	--	7,775	--	1,057
Canadian Labour Congress	12,305	5,307	--	6,998	--	--
Independent	1,152	375	--	777	--	--
Other associations and groups	1,057	--	--	--	--	1,057
Total under Federal and Provincial Jurisdiction	45,548	18,441	11,703	7,775	4,429	3,200
Canadian Labour Congress	41,421	16,925	11,703	6,998	4,429	1,366
Independent	1,665	888	--	777	--	--
Other associations and groups	2,462	628	--	--	--	1,834

Source: Saskatchewan Department of Labour.

Table 34

MEMBERSHIP IN LABOR UNIONS IN SASKATCHEWAN
BY INDUSTRY
1954-1957

Industry	1954	1955	1956	1957
Trade	2,355	2,282	2,290	1,678
Mining	886	1,097	1,272	1,546
Manufacturing	5,116	5,136	5,276	6,114
Construction	2,894	2,703	2,724	3,562
Transportation, Storage, and Communication	13,956	14,088	13,967	14,370
Public Utility Operation	3,746	4,020	3,381	2,175
Private Utility Operation	--	--	--	45
Finance, Insurance, and Real Estate	270	289	295	295
Government Service	4,808	5,534	6,671	8,396
Other Service	4,723	4,993	6,269	7,367
Total	38,754	40,142	42,145	45,548

Source: Saskatchewan Department of Labour.

In addition to raw materials, production materials also include partly processed or semimanufactured products, such as pig iron, sheet steel, lumber, and rough castings. Apart from materials of this type that originate from provincial resources, these for the most part must be imported from eastern Canada.

Transportation and Distribution

Transportation Availability

Transportation is a major factor in industrial location, both in terms of cost and services. More than any other area in North America, the Prairie Provinces (and Saskatchewan in particular) have been aware of the disadvantage of their geographic location in relation to markets and sources of manufactured goods and, consequently, of the vital importance of an effective transportation system to their economic development.

It is, therefore, not surprising to find that there has been a remarkably heavy capital investment in transportation facilities. For instance, in 1957 Saskatchewan had almost 20 percent of Canada's single track railway mileage and more than 15 percent of Canada's surfaced roads--almost four times as much railway trackage and three times as many surfaced roads per capita as the average for all of Canada.

Railway main line trackage has almost stabilized at around 8,700 miles. The populated portion of the province is well supplied with railway facilities, although there are a few gaps in some areas. The only likely significant extensions would arise from the development of the north (see Figure 26).

On the other hand, there has been a rapid expansion of bituminous surfacing on the Saskatchewan highway system. In the ten years from 1947 to 1957, bituminous surfaced highways have increased almost fourfold, from 367 miles to 1,356 miles, so that all principal centers in the province are now linked by high-quality all-weather roads (see Table 35).

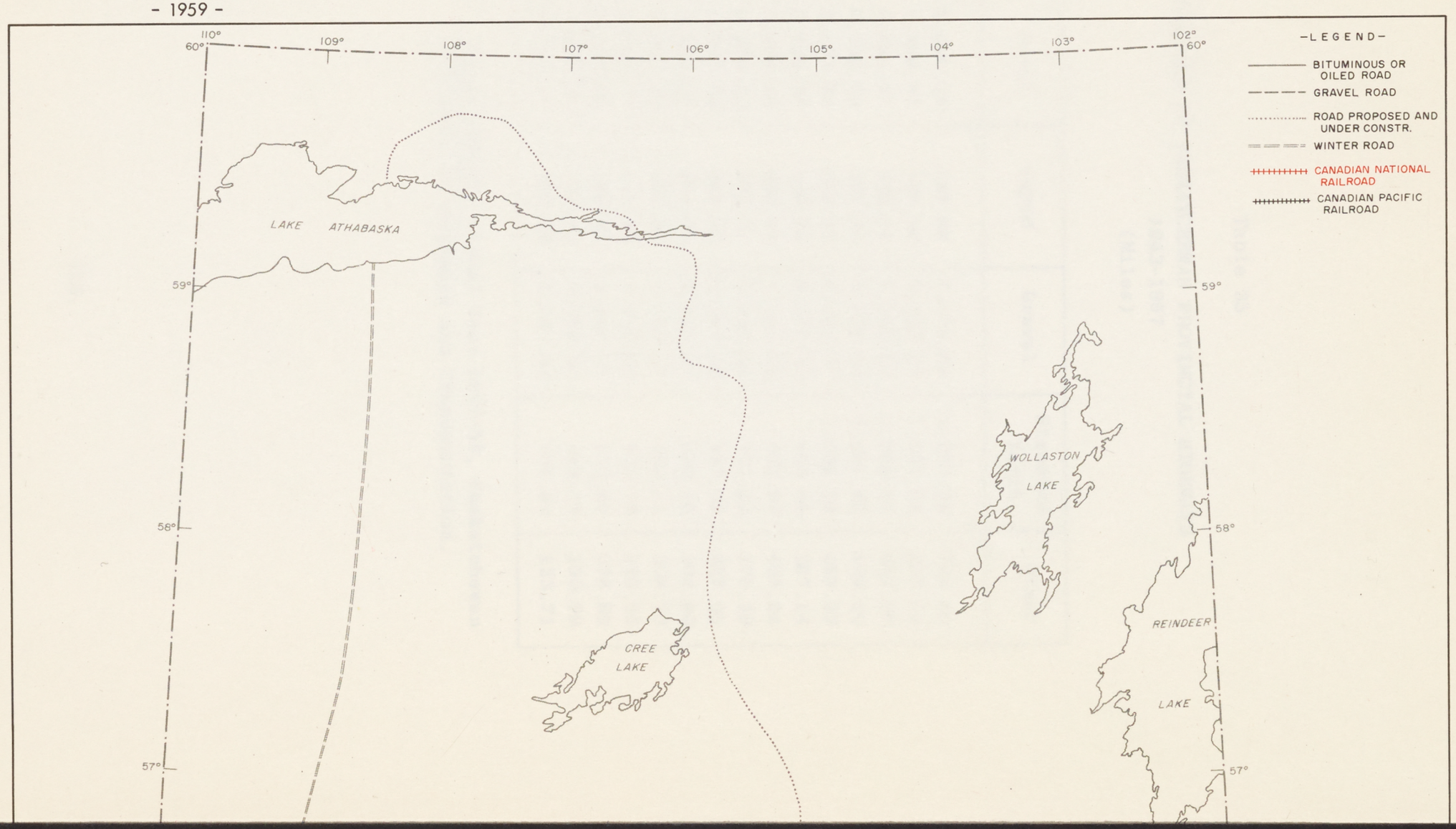
Development of all-weather highways has sparked a sharp increase in trucking services, so that for the first time in Saskatchewan history there are now two competitive modes of transportation by which many goods may be shipped. Undoubtedly, this places industry in a more favorable position than it has ever been.

Bus services have also improved. The provincially owned Saskatchewan Transportation Company operates a fleet of 52 buses serving all the cities and many of the towns daily, as well as providing less frequent services to other centers. This service supplements express deliveries and in some cases supplants the railways as far as passenger and mail service is concerned. In addition, links to interprovincial and transcontinental bus service are provided by Greyhound Lines of Canada.

The province is also in a favorable position as far as air services are concerned. Fourteen transcontinental flights daily (seven westbound, seven eastbound) landing at either Saskatoon or Regina are provided by Trans-Canada Airlines. In addition, two Prairie regional services are provided daily, one by Trans-Canada Airlines linking Winnipeg, Yorkton, Regina, Swift Current, Medicine Hat, Lethbridge, and Calgary, and the other by Pacific Western Airlines linking Regina, Saskatoon, Prince Albert, North Battleford, Lloydminster, and Edmonton (see Figure 27).

FIG. 26

SASKATCHEWAN RAILROAD NETWORK
- 1959 -



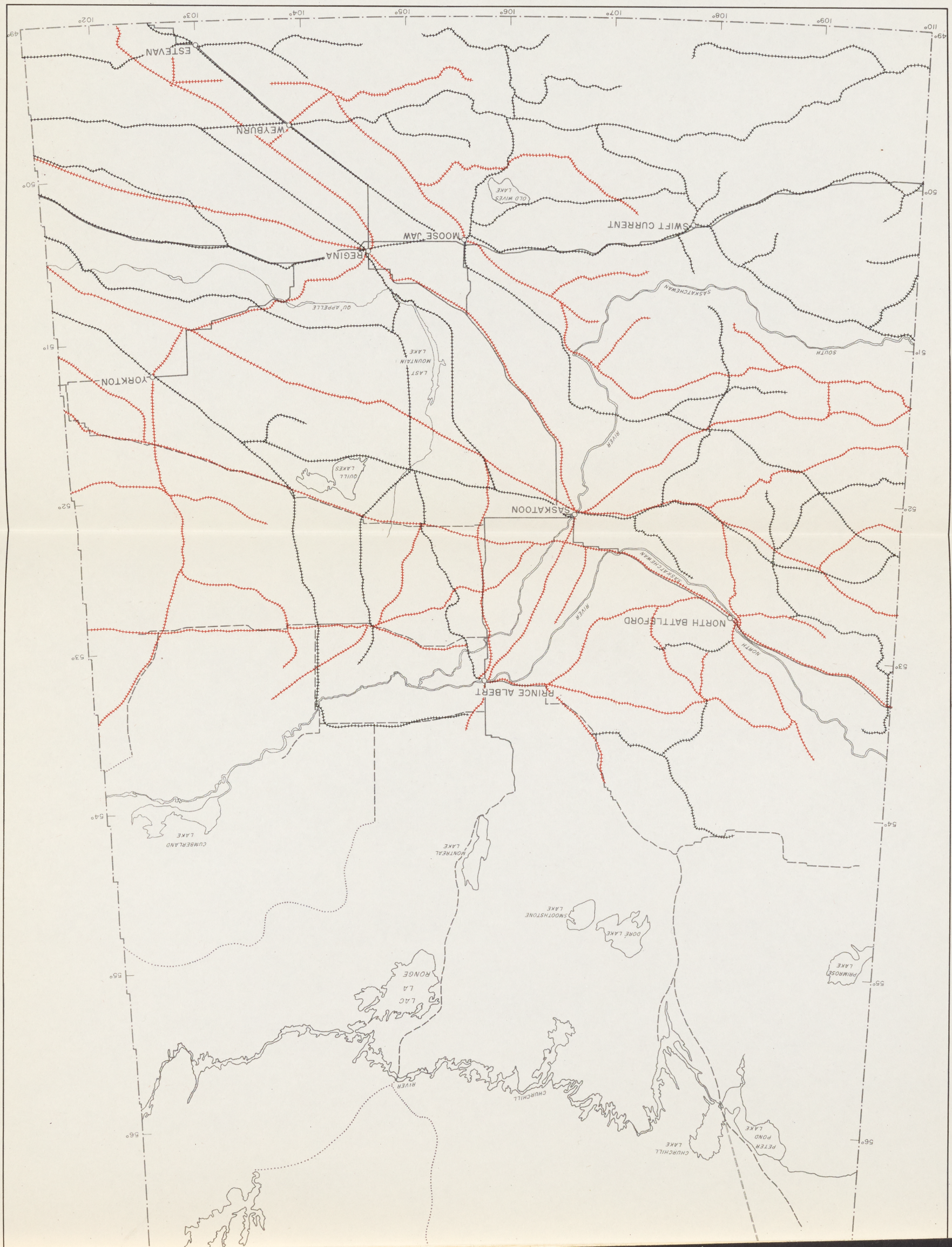

ESTEVAN
WEYBURN
REGINA
MOOSE JAW
SWIFT CURRENT
YORKTON
SASKATOON
NORTH BATTLEFORD
PRINCE ALBERT
OLD WIVES LAKE
QU'APPELLE
LAST MOUNTAIN LAKE
QUILL LAKES
SASKATCHEWAN
SOUTH
RIVER
NORTH
CUMBERLAND LAKE
MONTREAL LAKE
SMOOTHSTONE LAKE
DORÉ LAKE
PRIMROSE LAKE
LAC LA RONGE
CHURCHILL
PETER POND LAKE
102°
103°
104°
105°
106°
107°
108°
109°
110°
49°
50°
51°
52°
53°
54°
55°
56°

Table 35

SURFACES OF SASKATCHEWAN PROVINCIAL HIGHWAYS
1943–1957
(Miles)

Year	Total	Paved	Gravel	Standard Earth	Other
1943	8,006.26	138.59	4,872.88	2,270.33	724.46
1944	7,998.87	138.59	5,223.07	1,961.56	675.65
1945	8,051.87	132.51	5,589.80	1,689.50	640.06
1946	8,082.62	192.80	6,028.40	1,291.82	569.60
1947	8,153.64	367.55	6,264.77	1,062.09	459.23
1948	8,224.65	498.36	6,372.73	966.42	387.14
1949	8,308.24	599.45	6,417.89	887.06	403.84
1950	8,275.83	722.71	6,438.49	741.24	373.39
1951	8,267.33	815.00	6,397.06	727.32	327.95
1952	8,219.15	956.53	6,437.57	520.15	304.90
1953	8,197.98	1,077.96	6,372.17	439.11	308.74
1954	8,281.79	1,111.43	6,439.05	405.76	325.55
1955	8,222.63	1,160.65	6,368.31	413.87	279.80
1956	8,239.00	1,182.87	6,686.95	218.19	150.99
1957	8,179.37	1,356.58	6,547.44	151.64	123.71

Source: Annual Report, Fiscal Year 1957–58, Saskatchewan Department of Highways and Transportation.

Table 34

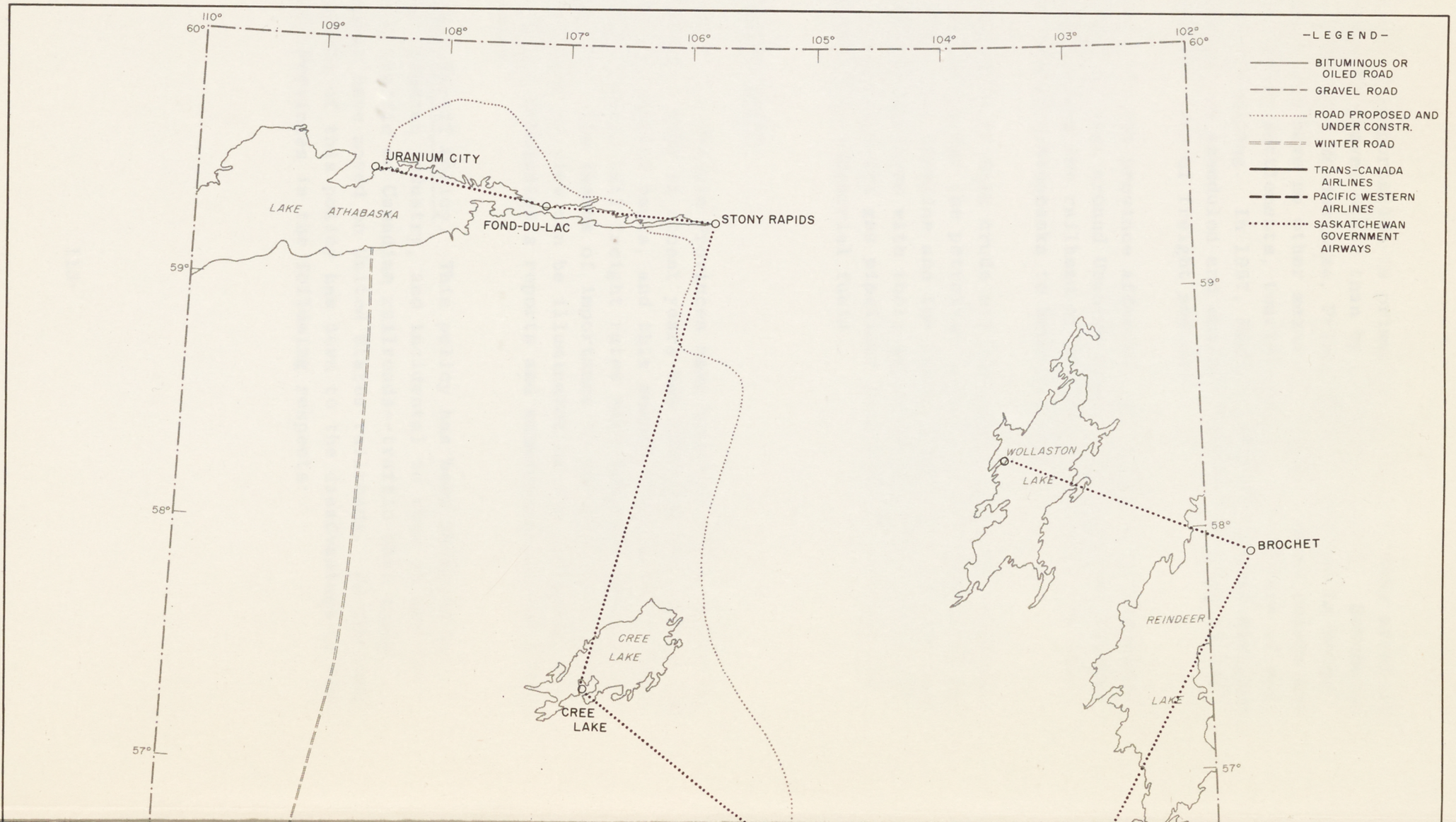
SURFACED OF SECONDARY PROVINCIAL HIGHWAYS
1919-1957
(Miles)

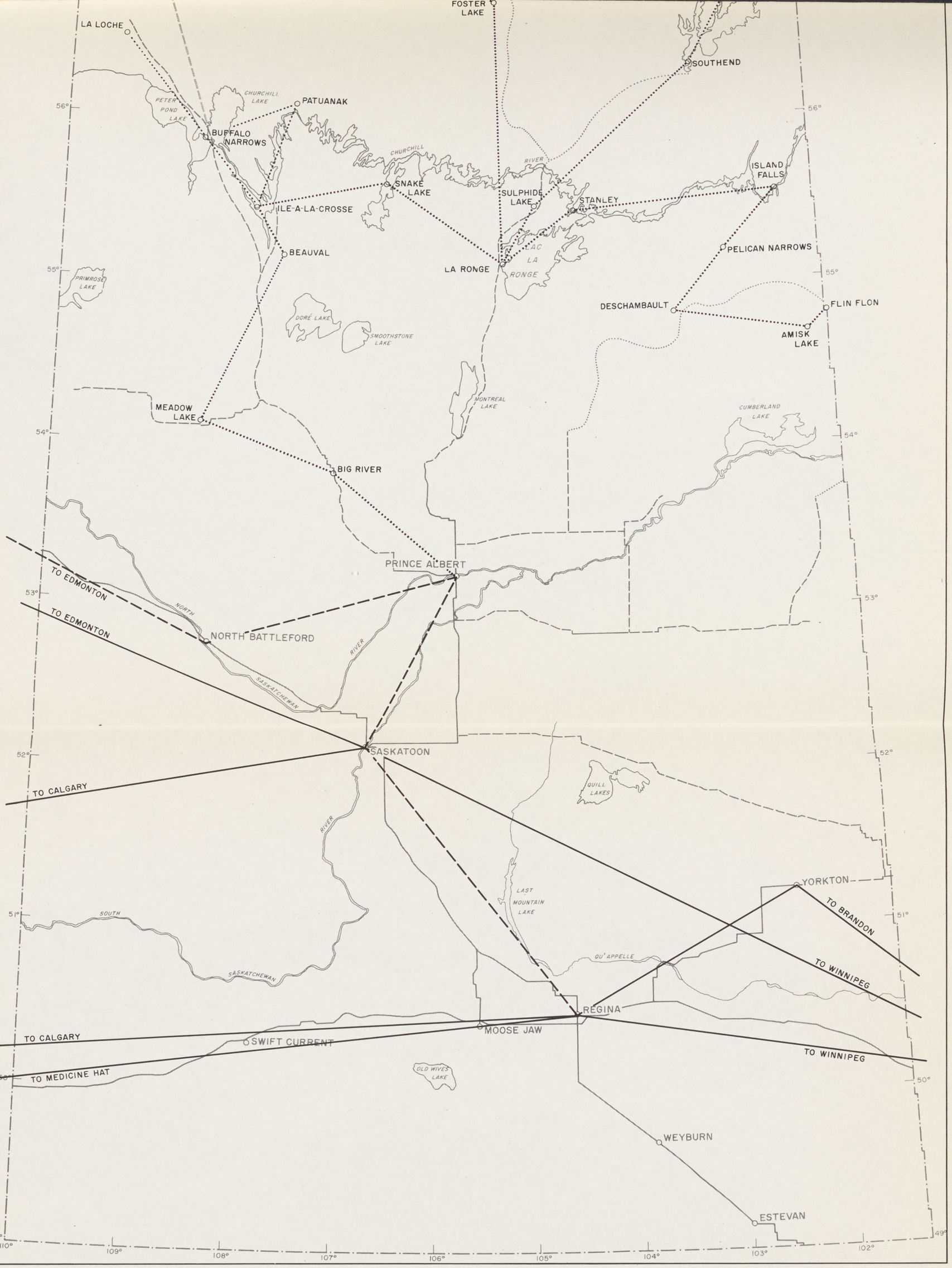
Year	Total	Paved	Gravel	Stabilized Earth	Other
1943	8,000.30	138.95	4,872.96	2,870.51	118.48
1944	7,988.87	138.59	4,827.47	2,961.96	61.85
1945	8,081.87	133.31	4,880.81	2,969.80	97.95
1946	8,088.82	133.40	4,888.40	2,991.82	72.20
1947	8,152.01	287.85	4,904.77	2,969.09	89.29
1948	8,251.66	136.36	4,973.73	3,060.83	80.74
1949	8,208.24	290.15	4,917.89	2,967.06	103.84
1950	8,275.83	292.73	4,998.49	2,941.24	93.39
1951	8,287.33	413.00	4,997.00	2,767.93	97.39
1952	8,210.38	388.83	4,827.27	2,860.83	93.49
1953	8,127.86	1,074.06	4,872.17	2,139.17	92.41
1954	8,281.79	1,111.43	4,439.08	2,603.70	125.86
1955	8,255.83	1,260.05	4,298.11	2,413.07	279.80
1956	8,250.00	1,323.87	4,284.56	2,216.19	180.89
1957	8,179.37	1,259.58	4,217.44	2,171.64	133.71

Source: Annual Report, Fiscal Year 1957-58, Saskatchewan Department of Highways and Transportation.

FIG. 27

SASKATCHEWAN AIR SERVICES
- 1959 -




LA LOCHE
FOSTER LAKE
SOUTHEND
PETER POND LAKE
CHURCHILL LAKE
PATUANAK
BUFFALO NARROWS
CHURCHILL RIVER
SNAKE LAKE
ILE-A-LA-CROSSE
SULPHIDE LAKE
STANLEY
ISLAND FALLS
BEAUVAL
LAC LA RONGE
LA RONGE
PELICAN NARROWS
PRIMROSE LAKE
DORÉ LAKE
SMOOTHSTONE LAKE
DESCHAMBAULT
FLIN FLON
AMISK LAKE
MEADOW LAKE
MONTREAL LAKE
CUMBERLAND LAKE
BIG RIVER
PRINCE ALBERT
TO EDMONTON
TO EDMONTON
NORTH SASKATCHEWAN RIVER
NORTH BATTLEFORD
SASKATOON
TO CALGARY
QUILL LAKES
YORKTON
TO BRANDON
LAST MOUNTAIN LAKE
SOUTH SASKATCHEWAN RIVER
QU'APPELLE
TO WINNIPEG
REGINA
TO CALGARY
MOOSE JAW
SWIFT CURRENT
TO WINNIPEG
TO MEDICINE HAT
OLD WIVES LAKE
WEYBURN
ESTEVAN
56°
55°
54°
53°
52°
51°
50°
49°
110°
109°
108°
107°
106°
105°
104°
103°
102°

In the north, transportation is primarily by air; to many areas it is the only method of travel other than by canoe or on foot. Scheduled service is provided from Meadow Lake, Prince Albert, and Lac La Ronge to 19 points which now have no other means of access. These points are either Metis or Indian settlements, tourist resorts, or centers of mineral exploration and mining. In 1957, Saskatchewan Government Airlines operated 24 aircraft on scheduled and charter flights carrying 17,748 passengers and 2,900 tons of freight and mail.

The only area in the province affected, or likely to be affected, by water transport is that around Uranium City. In the summer, freight is shipped by barge from the railhead at Waterways, Alberta, via the Athabaska River and Lake Athabaska to Uranium City.

Pipeline movement of bulk crude oil and natural gas are of prime importance in marketing for the petroleum industry. The completion of the Interprovincial oil pipeline and the Trans-Canada gas pipeline has linked Saskatchewan suppliers with their major markets (see Figure 28). The extent of intraprovincial gas pipelines is discussed below in the subsection dealing with industrial fuels.

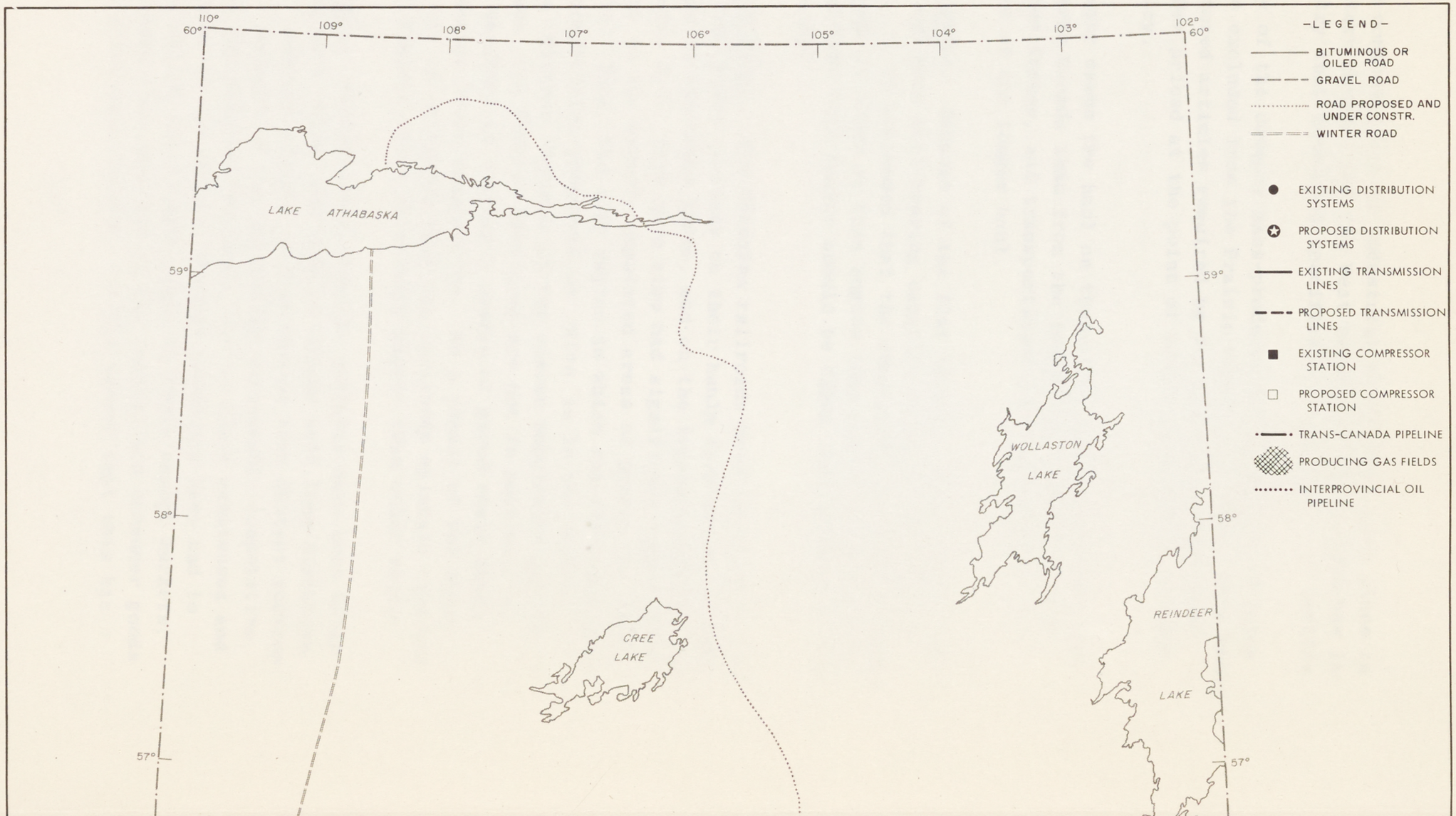
Transportation Costs

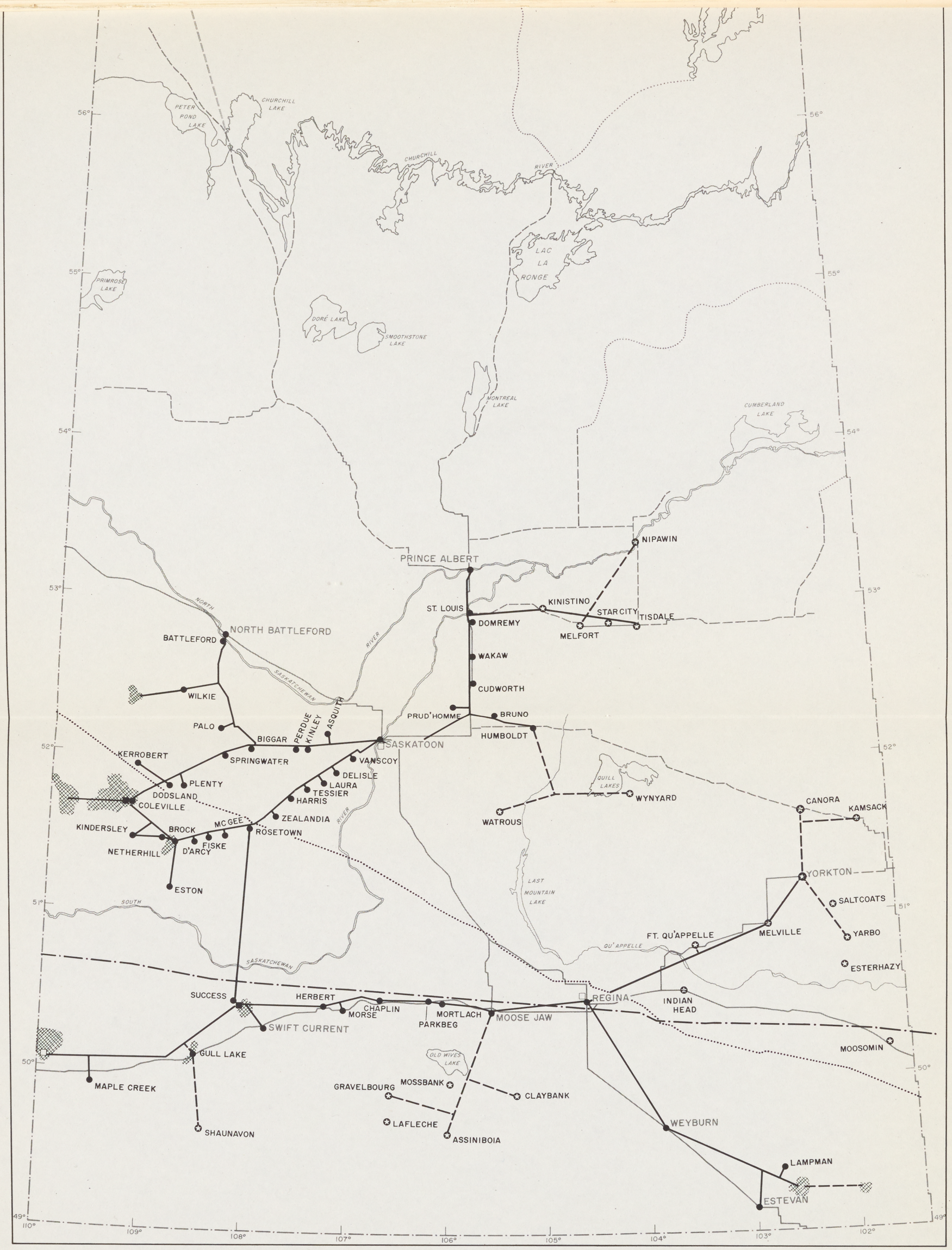
Historically, the Prairie Provinces have been dependent solely on rail transportation. Only in recent years has trucking offered any competition on interprovincial hauls, and this competition is still minor. Canadian transcontinental rail freight rates have been the subject of many investigations. The issues of importance to the Prairie Provinces and the Prairie point of view can be illuminated by the following abstracts of the Royal Commission's reports and submissions to the commission on rail rates.

1. Canadian Tariff Policy. This policy has been designed to foster Canadian industry, and incidental to this it has increased traffic on Canadian railroads--traffic that would otherwise have moved on United States railroads. In the past, the effect of this policy has been to the disadvantage of the Prairie Provinces in the following respects:

FIG. 28

SASKATCHEWAN NATURAL GAS DISTRIBUTION SYSTEMS
AND GAS AND OIL TRANSMISSION LINES
1958 AND PROPOSED




CHURCHILL LAKE
PETER POND LAKE
CHURCHILL RIVER
LAC LA RONGE
PRIMROSE LAKE
DORÉ LAKE
SMOOTHSTONE LAKE
MONTREAL LAKE
CUMBERLAND LAKE
56°
55°
54°
53°
52°
51°
50°
49°
110°
109°
108°
107°
106°
105°
104°
103°
102°
NIPAWIN
PRINCE ALBERT
ST. LOUIS
KINISTINO
STAR CITY
TISDALE
MELFORT
DOMREMY
WAKAW
CUDWORTH
PRUD'HOMME
BRUNO
HUMBOLDT
SASKATOON
NORTH BATTLEFORD
BATTLEFORD
NORTH SASKATCHEWAN RIVER
WILKIE
PALO
BIGGAR
PERDUE
KINLEY
ASQUITH
KERROBERT
SPRINGWATER
VANSCOY
DELISLE
LAURA
TESSIER
HARRIS
PLENTY
DODSLAND
COLEVILLE
ZEALANDIA
KINDERSLEY
BROCK
MCGEE
ROSETOWN
NETHERHILL
D'ARCY
FISKE
ESTON
WATROUS
QUILL LAKES
WYNYARD
CANORA
KAMSACK
YORKTON
LAST MOUNTAIN LAKE
SALTCOATS
YARBO
FT. QU'APPELLE
QU'APPELLE
MELVILLE
ESTERHAZY
SOUTH SASKATCHEWAN
SUCCESS
HERBERT
CHAPLIN
MORSE
MORTLACH
PARKBEG
MOOSE JAW
REGINA
INDIAN HEAD
SWIFT CURRENT
MOOSOMIN
GULL LAKE
OLD WIVES LAKE
MAPLE CREEK
GRAVELBOURG
MOSSBANK
CLAYBANK
LAFLECHE
ASSINIBOIA
SHAUNAVON
WEYBURN
LAMPMAN
ESTEVAN

a. The concentration of industrial development took place in eastern Canada, and the West benefited little from new industry that developed specifically as a result of tariffs.

b. Many of the cheaper mass-produced United States articles were excluded from the Prairie Provinces. Thus, many manufactured articles required by the Prairie economy were higher priced at the point of origin as a result of this policy.

c. In many cases the haul on these articles was farther from eastern Canada than from the industrial centers of the United States, and transportation costs were higher because of the longer haul.

2. Regional Costs. Because of the flat terrain, dry climatic conditions, and good soil-bearing capacity found in the Prairie Provinces, it is contended that the construction and maintenance of railroads is lower in this region than in any other part of Canada and that this factor should be taken into account in the rate structure.

3. Competitive Rates. The Canadian railroads have had to face competition from water carriers on their hauls from eastern Canada to the head of the Great Lakes, and on the transcontinental haul to Vancouver, B.C. They have also had significant competition from trucks in the densely populated areas of Quebec and eastern Ontario. Thus, the only region in which the railroads have not felt competitive pressures on rates is in the Prairie Provinces. Further, because of the sparse population and severe climate, the Prairie Provinces are not in position to build and maintain an elaborate system of paved roads which would encourage truck competition. As a result of the above situation, it is contended that the railroads maintain revenues by keeping Prairie rates relatively higher than other rates.

4. The Long Haul. Historically, Prairie products have been bulky relative to unit value, and move in volume over long distances to market. Inbound freight is also hauled from distant sources of supply. Because of the relatively unfavorable competitive position of the Prairie Provinces, due to their remoteness and the small size of the market, Prairie producers have had to bear almost all of the freight costs to their export markets, and at the same time have had to buy capital and consumer goods at factory price plus freight. To the extent that this has

occurred, people in the Prairie Provinces had had to pay a disproportionate amount of the freight relative to people in other parts of Canada. Also, because of this situation freight rate increases "across the board" tend to have a greater impact on the Prairie economy.

5. Crow's Nest Pass Agreement. Under this agreement grain rates were established at a low level in 1912 to encourage settlement of the Prairie Provinces. The development of Prairie agriculture has been predicated on the assumption that these rates would remain in effect indefinitely. If these rates were increased, it is contended that this would amount to a confiscation of capital as a result of reduced land prices and earnings.

There are a number of other issues, such as agreed charges and tax-free status of railroads which affect Prairie freight rates, but apply equally to all regions of Canada.

To offset the transportation disadvantage of the Prairie regions resulting from the above factors, two courses of action have been suggested: (1) the application of the principle of equalization of rates as far as might be practiced in view of the complicated basis upon which rates are established (To effect such a change would mean a new rate structure and regulation of competitors' rates and services to allow railroads to remain competitive in those regions where their rates were increased.), and (2) a direct subsidy to allow specific rate reductions.

It was stated in the Saskatchewan submission to the Royal Commission on Transportation in 1949 that "Producers and consumers in Saskatchewan are farther from the markets in which they buy and sell than are those of any other province." The effect of this situation on industrial location is directly related to the rate structure, market area, and supply area of specific industries.

Although the distance from markets almost without exception has an unfavorable effect upon the consumer in the Prairie Provinces, one must not fall into the error of assuming that the same judgment applies in equal measure to industrial development. Actually for the Prairie market-oriented industries the more than 150 percent increase in the general level of freight rates since 1948 has been perhaps a greater stimulus than any other factor. Like a tariff, high external transportation costs shelter an industry that might not otherwise be able to meet the prices of a larger competitor, due to smaller scale operations and higher costs of production. Like an increase in tariffs, an increase in freight rates extends the range of possible industrial development for the domestic market.

On the other hand, increases in freight rates have increased the difficulties of establishing industries in the Prairie Provinces designed to serve a Canada-wide or world-wide market.

Industries that use Prairie natural resources as their raw material and whose operations require a production scale considerably beyond the possible consumption of the Prairie region, and therefore must seek markets in eastern Canada, British Columbia, the United States, or overseas, are obviously handicapped in reaching their markets by tariff and transportation barriers.

Prairie industries that are extractive, and orient their production to export markets, are benefited by low freight rates on raw materials. Prairie industries that refine, process, or fabricate local raw materials for the export market are hurt, competitively, by low freight rates on raw materials and need low freight rates on semiprocessed or semifabricated goods.

For Prairie industries whose markets are primarily in the Prairie region, the situation is somewhat different. If they utilize local raw materials, low interregional freight rates on these raw materials will increase the competitive position of other regions in the local market. Prairie manufacturing industries producing for the Prairie market and utilizing local raw materials have everything in their favor except where economies of scale give outside producers an advantage.

If Prairie industries use imported raw materials, it is advantageous to have low inbound rates. Such industries must compete in terms of the savings available from shipping in raw materials in a bulk compact form as opposed to shipping in finished goods in a bulky and often fragile form, requiring high freight rates per ton and more expensive packaging. Thus, the competitive position of such industries is maximized if freight rates on inbound raw materials are low while rates on competing inbound finished products are high.

Rail Transportation Costs

The major factors taken into account in establishing freight rates are volume, distance, value of freight relative to weight, speed of delivery, competition, and the bargaining position of specific industries. The future of freight rates applying to the Prairie Provinces, and Saskatchewan in particular, will depend on:

1. The type and volume of freight that results from industrial and agricultural development, the increased consumer market in consequence of this development, and development of new markets.

2. The competitive situation that may develop from technological advances in the substitute services--motor carriers, airlines, and pipelines--will offer increasing competition to railroads. The St. Lawrence Seaway, allowing ocean-going vessels into Lake Superior, will also have its effect on transcontinental freight movements and rates.

3. Dominion government regulations and subsidy of transportation.

4. Negotiations between shippers and transport companies.

The most likely development in transportation is increased competition to rail. The speed and flexibility of trucks admirably suit the needs of light industry for transport over short and medium distances. Further improvement of roads allowing less maintenance, greater speed, and higher load limits will undoubtedly extend the economic operating range of trucks.

However, the dependence of the Prairie region on the railroads has not been affected greatly as yet. For instance, in 1957, the latest year for which truck freight statistics are available, total truck traffic moving to and from the Prairie region came to only 0.5 million tons as compared with a corresponding figure of over 20 million tons of rail freight. The development of bituminous surfaced highways in all the Prairie Provinces and particularly in Saskatchewan and Alberta has facilitated an extensive freight movement by truck within the Prairie Provinces (see Table 36). The emphasis on shipments of manufactured goods is of particular interest to Prairie market-oriented industries, for while truck traffic has done little to alter interregional rail freight rates, it has served to reduce freight rates within the Prairie region as well as provide more facilities for serving the Prairie market more efficiently.

The dominion government has played an important part in regulating freight rates and services. With the income of the Prairie grain industry being acutely sensitive to the cost of transportation to its export markets, it is clear that the Crow's Nest Pass Agreement rates have kept the income of Prairie agriculture at a higher level than might otherwise have prevailed and have thereby maintained a larger Prairie market of interest to industry.

Table 36

FREIGHT CARRIED BY
FOR-HIRE AND PRIVATE INTERCITY TRUCKS
1957
(Thousands of Tons)

	Manitoba	Saskatchewan	Alberta	Total Prairie Provinces
Intraprovincial[1/]	1,925	8,842	18,965	29,732
Interprovincial (within Prairie region)	75	128	37	240
Interprovincial (outside Prairie region)	170	10	340	520
International	16	6	26	48
Total[2/]	2,186	8,986	19,368	30,540

1/ Excluding urban operations.
2/ Not including freight in transit through a province and freight carried entirely outside the province which is estimated to amount to less than 5 percent of the total.

Sources: Motor Transport Traffic Statistics, 1957, for each province, D.B.S. Motor Transport Traffic National Estimates, 1957, D.B.S.

In the fall of 1958, the Board of Transport Commissioners awarded a 17 percent rate increase on rail rates, estimated to increase total costs by about $60 million annually. In March 1959, it was announced that there would be a freight rate subsidy amounting to a maximum of $20 million paid by the Dominion Treasury.

In a relatively isolated region such as the Prairie Provinces, the question of development rates is often raised, applied particularly to development of resource-based industries. The Crow's Nest Pass rates are an example. The inference behind development rates is that they are temporary in nature and are applied in the same manner as an "infant industry" tariff, until the new industry becomes established and can compete on the basis of regular freight rates. A system of development rates or subsidy undoubtedly has merit. In fact, development rates may be justified on a permanent basis if the economic activity stimulated by the new industry is sufficient to offset the subsidy by increased tax revenue or increased freight revenue. However, when industries are set up on this basis, the development rate rather than the regular rate is often taken as one basis for capitalization of the industry; thus, there is considerable resistance to reverting to a regular rate.

Negotiations between shippers and transport companies is particularly important with large industries. A large potential shipper is frequently able to negotiate the freight rates necessary to reach a sufficient market to justify establishment of a plant. For example, while the regular rail class rate of $2.71 a hundred pounds on potash from Patience Lake, Saskatchewan, to Vancouver would have been prohibitive, the special negotiated commodity rate of 75 cents a hundred pounds (and equivalent reductions to other points) has made it feasible to proceed with developments in the potash industry.

As a general rule when negotiating rates, the railroads operate between the limits set by the "cost of service" and "value of service" principles in freight rate determination. In other words, the freight rate charged will be somewhere between what the freight managers estimate is the out-of-pocket cost of moving the commodity and the freight charge that the commodity can bear in the market, with the proviso that the over-all revenues must be large enough to meet the over-all costs of the railroad. Obviously, the out-of-pocket costs of moving a commodity increase with distance although there is no precise relationship between the two. The general picture, however, is one of relatively high terminal costs connected with loading the freight cars and marshaling them into trains and relatively lower carrying costs associated with the actual rail movement.

Truck Transportation Costs

Existing truck freight rates on selected items moving to and from the major Prairie cities are shown in Table 37.

Distribution

Facilities and services which aid in the efficient movement of goods and transfer of ownership are important considerations in plant location. Transportation facilities have already been discussed. Public storage and warehousing facilities in most of the major cities are currently adequate to handle a substantial increase in stored merchandise. The main centers are all well supplied with services in the form of brokers, branches of the major Canadian banks, lending institutions, and communications. These combined with available physical facilities allow efficient movement of goods and transfer of ownership.

In addition to the availability of facilities, distribution costs have an influence on plant location, according to the market orientation of the industry. Extractive industries producing primarily for an export market will tend to minimize transportation costs by locating as close to the source of raw materials as possible consistent with the other location factors, particularly transportation services, labor supply and costs, and the availability of utilities. Industries producing primarily for the Prairie market, however, will try to minimize transportation costs by balancing raw material supply costs against the optimum location for distribution to the major market centers (again, consistent with the location factors mentioned above).

If it is assumed that rates are proportional to distance and that the Prairie consumer market will be distributed in proportion to the major population centers, then optimum location for distribution in terms of minimum ton-miles may be calculated by taking each city in turn and multiplying the distance to and population of each of the other cities (see Table 38). On this basis the table shows Saskatoon to be the point with minimum distribution costs.

If the industry is oriented to the industrial market in supplying components used in manufacture or construction of plants and equipment in the Prairie region, the same pattern will apply only to the extent that the value of materials used in industry is proportional to population. Industries oriented to the industrial market will have to look to the present and potential pattern of their customers.

Table 37

EXISTING TRUCK FREIGHT RATES ON SELECTED ITEMS MOVING TO AND FROM MAJOR PRAIRIE CITIES

April 16, 1959

(Dollars per 100 Pounds)

	Winnipeg to				Regina to			Saskatoon to		Edmonton to Calgary
	Regina	Saskatoon	Calgary	Edmonton	Saskatoon	Calgary	Edmonton	Calgary	Edmonton	
Canned Goods										
Truckload	$1.05[1]	$1.28[1]	$1.65[1]	$1.65[1]	$0.59[2]	$1.45[3]	$1.51[3]	$1.30[3]	$1.19[3]	$0.88[3]
Truckload	0.89[3]	1.11[3]	1.55[3]	1.55[3]	0.54[4]					
Truckload	0.69[5]	0.93[5]	1.45[5]	1.45[5]						
Less than truckload	1.90	2.26	3.40	3.32	0.80	2.26	2.34	2.01	1.85	1.29
Textiles										
Truckload	1.15[6]	1.38[6]	1.78[6]	1.78[6]	0.98[2]	2.26[3]	2.34[3]	2.01[3]	1.85[3]	1.29[6]
Less than truckload					0.80[4]					
Chemicals (drums, cans)										
Truckload	1.10[3]	1.45[3]	2.10[3]	2.14[3]	0.59[2]	1.45[3]	1.51[3]	1.30[3]	1.19[3]	0.88[3]
Truckload					0.54[4]					
Less than truckload	1.90	2.26	2.40	3.32	0.80	2.26	2.34	2.01	1.85	1.29
Plastic Articles (unnested)[7]										
Truckload	2.35[3]	2.75[3]	4.14[3]	4.04[3]	1.77[2]	2.75[3]	2.84[3]	2.45[3]	2.25[3]	1.29[3]
Truckload						1.18[4]				
Less than truckload	5.52	6.46	9.74	9.50	2.36	6.46	6.70	5.76	5.28	2.58
Sheetmetal										
Truckload	0.69[5]	0.93[3]	1.55[3]	1.55[3]	1.54[2]	1.29[3]	1.33[3]	1.30[3]	1.19[3]	0.88[3]
Truckload					1.45[5]					
Less than truckload	0.89	1.08	2.68	2.61	0.59	1.78	1.84	1.58	1.45	0.98
Agricultural Machinery										
Truckload	1.10[3]	1.45[3]	1.94[3]	1.90[3]	1.77[2]	1.29[3]	1.33[3]	1.15[3]	1.05[3]	0.88[3]
Truckload					1.18[4]					
Less than truckload	4.72	6.46	9.74	9.50	2.36	6.46	6.70	5.76	5.38	2.58
Sheetmetal Products										
Truckload	1.10[3]	1.77[3]	2.78[3]	2.61[3]	0.80[2]	1.78[3]	1.84[3]	1.58[3]	1.45[3]	0.98[3]
Truckload					0.59[4]					
Less than truckload	2.35	2.75	4.14	4.04	0.98	2.75	2.84	2.45	2.25	1.29
Building Board										
Truckload	1.05[1]	1.28[1]	1.65[1]	1.65[1]	0.54[2]	1.33[3]	1.29[3]	1.05[3]	1.15[3]	0.88[3]
Truckload	0.89[3]	1.11[3]	1.55[3]	1.55[3]						
Truckload	0.69[5]	0.93[5]	1.45[5]	1.45[5]						
Less than truckload	1.44	1.77	1.68	2.61	0.59	1.84	1.78	1.45	1.58	0.98

1/ 10,000 lb.
2/ 15,000 lb.
3/ 20,000 lb.
4/ 24,000 lb.
5/ 30,000 lb.
6/ Pool truck rate.
7/ Nested plastic articles approximately 1/2 above rates.

Table 38

LOCATION OF MAJOR PRAIRIE CITIES IN SUPPLYING THE PRAIRIE MARKET

City	Population	Sum of Population × Miles to Each of Other Cities	Index of Population Miles Regina = 100
Edmonton	226,002	306,216,614	102.4
Calgary	181,780	328,101,488	109.7
Winnipeg	255,093	397,633,452	132.9
Regina	89,755	299,133,500	100.0
Saskatoon	72,858	280,806,230	93.9

	Mileage				
	Edmonton	Calgary	Winnipeg	Regina	Saskatoon
Edmonton	--	195	797	487	326
Calgary	195	--	832	476	399
Winnipeg	797	832	--	356	471
Regina	487	476	356	--	161
Saskatoon	326	399	471	161	--

Source: Population data are from Census of Canada, 1956, D.B.S.

If supplies are within the Prairie market area, then specific sources of supply will be critical to location. If supplies are imported from the east or west, then location to minimize import cost would be Manitoba or Alberta, respectively, depending on the direction from which imports are received. However, in plant location the aim is to minimize the sum of import and distribution costs.

Availability of Industrial Sites

Land available for industrial expansion in and around Saskatchewan's cities and towns is for all practical purposes unlimited. This land would require a minimum of site preparation, since the terrain is almost flat; virtually all areas south of the forest belt are free of trees and brush. Site preparation in the Precambrian shield area would present more of a problem because of the preponderance of rocks. Subsoils, drainage, and susceptibility to flooding vary considerably between cities and between sites in the same city. However, in general, the soils and subsoils of the province have good bearing capacity and drainage. It is relatively easy to avoid the areas that are subject to flooding. Table 39 summarizes the availability of industrial land in the nine major cities of the province.

Living Conditions

Housing

Housing is still somewhat limited in some of the larger Saskatchewan urban centers. However, in both Regina and Saskatoon, the two centers with the greatest need for additional housing facilities, the pace of building construction has accelerated. Regina has embarked upon a municipal housing scheme with federal and provincial assistance, while Saskatoon is giving consideration to such a step upon the conclusion of its recent housing survey. However, in terms of persons per dwelling, Saskatchewan stands favorably in comparison with the national average (see Tables 40 and 41).

A disadvantage of some smaller Saskatchewan communities is their rather unattractive appearance, due to such factors as unpaved streets, small lots, and lack of trees.

Table 39

AVAILABILITY OF INDUSTRIAL SITES
IN 8[1/] SASKATCHEWAN CITIES

City	Acreage in City		Total Acreage Available		No. of Acres City Owned	No. of Acres Privately Owned	No. of Acres with Access to Trackage	No. of Acres Served with Utilities
	Zoned Heavy Industry	Zoned Medium and Light Industry	Zoned Heavy Industry	Zoned Medium and Light Industry				
Estevan	950	7	907	n.a.	265	692	111	55
Moose Jaw	500	700	200	400	1,000	200	800	500
North Battleford	90	40	--	30	30	100	--	--
Prince Albert	474	86	237	17	70	n.a.	70	70
Regina	n.a.	n.a.	n.a.	n.a.	70	115	185	185
Saskatoon	1,100	1,100	600	400	800	1,200	500	1,200
Swift Current	40	145	30	30	60	125	100	155
Weyburn	807	95	580	95	675	227	n.a.	100

n.a. = not available

[1/] No statistics given on Yorkton.

Source: Survey of Saskatchewan cities.

Table 40

DWELLINGS AND AVERAGE NUMBER OF PERSONS PER DWELLING
FOR CANADA AND THE PRAIRIE PROVINCES
1921-1951

Province and Census Year	Occupied Dwellings	Persons per Dwelling
Canada[1/]		
1921	1,764,012	4.97
1931	2,227,000	4.65
1941	2,573,155	4.47
1951	3,349,580	4.07
Manitoba		
1921	117,541	5.19
1931	145,577	4.81
1941	163,655	4.46
1951	202,968	3.83
Saskatchewan		
1921	163,661	4.63
1931	197,572	4.67
1941	207,173	4.32
1951	222,235	3.74
Alberta		
1921	136,125	4.32
1931	171,670	4.26
1941	193,246	4.12
1951	251,891	3.73

[1/] Not including Newfoundland, the Yukon, and Northwest Territories.

Source: Ninth Census of Canada, 1951, D.B.S., Volume III, Table 1.

Table 41

OCCUPIED DWELLINGS IN CANADA
AND THE PRAIRIE PROVINCES, BY TYPE OF DWELLING
1951

Type of Dwelling	Canada	Saskatchewan	Alberta	Manitoba
Single Detached[1/]				
Number	2,275,615	192,100	204,000	158,615
Percent	67%	87%	81%	78%
Single Attached				
Number	237,655	8,815	7,850	7,300
Percent	7%	4%	3%	4%
Apartments				
Number	885,565	19,705	37,085	36,090
Percent	26%	9%	15%	18%
Total				
Number	3,409,295	221,455	250,750	202,400
Percent	100%	100%	100%	100%

1/ Includes occupied trailers, houseboats, tents, boxcars, and other miscellaneous types.

Source: Ninth Census of Canada, 1951, D.B.S., Volume III.

Education

Educational facilities and teachers for elementary and high school pupils are above average in Saskatchewan schools. Table 42 indicates that in terms of pupils per teacher and pupils per schoolroom, Saskatchewan compares favorably with the other Prairie Provinces and Canada. Most of the high schools offer technical and vocational training in addition to academic courses. The provincial government has now established a technical institute at Moose Jaw specifically set up to train skilled personnel for work in government and industry. The Department of Education and the University of Saskatchewan administer programs of adult education, and the Department of Labour operates a broad apprentice training scheme. There are two teachers' colleges, and the University of Saskatchewan (enrollment 4,000) offers a full range of courses in the arts, commerce, sciences, engineering, law, medicine, and agriculture.

Recreation

Outdoor recreation available in Saskatchewan is one of the province's important assets. The northern regions, accessible mainly by plane, are known primarily for hunting, fishing, and camping; the more accessible southern regions for fishing, hunting, duck shooting, swimming, and boating. There are numerous lakes and wooded areas; however, many of these have not been specifically developed for recreation purposes. In those where development has taken place in the form of commercial parks and summer cottages, there has been little control of the type of development. This situation was the subject of a study by W. B. Baker, Recreation Consultant, made for the Saskatchewan Department of Natural Resources in 1958. The purpose of the study was to formulate a program for development and control of recreational facilities in parts of southern Saskatchewan consistent with the needs and demands of the people most likely to use these facilities.

In indoor recreation there are good facilities in most centers for curling, ice skating, and other sports.

Health

The province has a comprehensive hospital service plan. If there is medical necessity for hospital care, the plan pays, on behalf of beneficiaries who are admitted as inpatients, for most services provided by the hospital concerned. An annual hospitalization tax of $17.50 per

Table 42

NUMBER OF TEACHERS AND ENROLLMENT IN PUBLICLY CONTROLLED ELEMENTARY AND SECONDARY SCHOOLS IN CANADA AND THE PRAIRIE PROVINCES 1950-1954

Region and Year	Teachers	Enrollment	Pupils per Teacher	Pupils per Schoolroom[1/]
Canada				
1950	88,289	2,377,529	26.9	
1951	93,089	2,446,742	26.3	
1952	96,856	2,567,849	26.5	
1953	100,963	2,708,846	26.8	28.9
1954	105,288	2,864,102	27.2	
Manitoba				
1950	4,829	126,477	26.2	
1951	4,990	128,868	25.8	
1952	5,147	132,808	25.8	
1953	5,358	139,590	26.1	27.8
1954	5,600	146,619	26.2	
Saskatchewan				
1950	7,210	166,747	23.1	
1951	7,218	167,485	23.2	
1952	7,226	168,300	23.3	
1953	7,234	163,466	22.6	22.8
1954	7,199	170,415	23.7	
Alberta				
1950	6,071	167,790	27.6	
1951	6,788	173,969	25.6	
1952	6,938	179,691	25.9	
1953	7,138	189,081	26.5	28.8
1954	7,455	201,420	27.0	

1/ Numbers of elementary and secondary schoolrooms are available only for 1952/53 school year. The source of this data is: School Finance in Canada, 1955, by Canadian School Trustees' Association.

Source: Survey of Elementary and Secondary Education, 1950-54, D.B.S., No. 74, pp. 32 and 69.

person is levied on all persons resident in the province for three months or more who are 18 years of age or over (except for specified exemption applying to students, incapacitated people, and people covered by Dominion Welfare programs).

Climate

In an article in the February 1959 issue of Industrial Development, L. A. Joos wrote:

> It is probably true that a factory or processing plant will not usually locate in the North Central area [of the United States] because of the climate, but in spite of it . . . Since the climate of the North Central area shows such great variability it is unlikely that an industry seeking a particular climate will locate in this part of the country. If certain outdoor conditions are considered optimum or necessary for a process, it is obvious that such conditions will prevail during only part of the year. Location of industry within the North Central area is primarily for reasons of raw materials, labor supply, nearness to markets, power, transport facilities, etc.

This analysis applies equally well to Saskatchewan. The winter climate is undoubtedly unfavorable but no more so than many other areas of North America which have experienced substantial industrialization.

Industrial Fuel and Power

As a result of postwar developments, the province of Saskatchewan is in a favorable position regarding supplies of industrial fuel and power. In ten years the province has changed from a fuel-importing area to one of substantial net fuel export with growing reserves of petroleum and natural gas. At the same time the accelerated integration of the power system in the province has brought significant reductions in the cost of electric power and the prospect of further reductions in the future. There are also large reserves of industrial coal. All of these factors have increased the industrial development potential of the province.

Electric Power

In the past, the province of Saskatchewan has faced a particularly difficult problem in power generation. It lacked the advantage of the huge water resources within economic range of the principal centers of population which has been such an encouragement to industry in Ontario, Manitoba, British Columbia, and Quebec. This meant a complete reliance on the more costly generation of power in steam and diesel plants (apart from the water power resources at Island Falls utilized for the Flin Flon mining development).

The problem was aggravated by the uncoordinated construction of many small units by municipalities and private companies to serve the needs of small local areas. In 1930 there were 135 power generating plants in the province with an average capacity of little more than 600 kilowatts, at a time when less than a quarter of the occupied dwellings in the province were electrified. Even if other factors had been favorable, industrial development clearly would have been inhibited by the high costs resulting from inefficient generation.

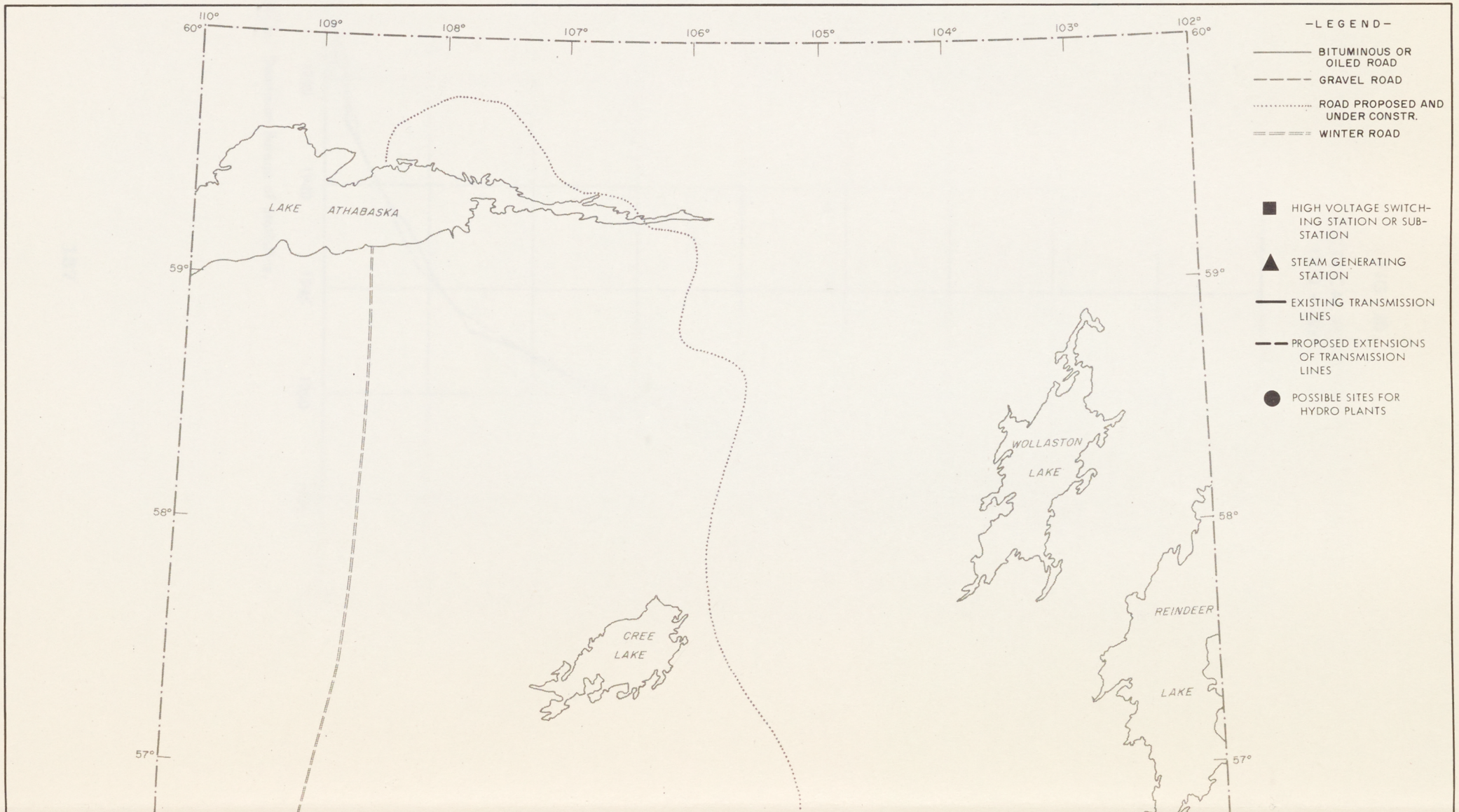
This problem was dealt with through the establishment of a fully integrated power system for the province. Thus the economies of scale associated with generating all the power needs for the province in a few large plants could be combined with the opportunity to concentrate power production in the areas of lowest fuel cost. (See Figure 29 for a map of principal electric transmission lines.)

A beginning was made in 1929 with the establishment of the Saskatchewan Power Commission. The consolidation of the power facilities in the province proceeded relatively slowly until 1949 when the Saskatchewan Power Corporation was established. Although the process of integration is not fully completed, 75 percent of the power-generating capacity of the province (not including Island Falls) is now owned by the Saskatchewan Power Corporation, and the remaining 25 percent is made up by the Regina municipally owned plant and the privately owned utility which supplies the city of Moose Jaw.

The number of power plants has decreased to only one-tenth of what it was in 1930, while over-all plant capacity has increased by more than five times. Thus average plant capacity has increased sharply; the largest present plant is in excess of 100,000 kw, and two 264,000 kw plants are under construction. At the end of 1958 total kw capacity of all power plants in the province was approximately 450,000 kw as compared with 87,000 kw in 1930. The effect of these changes in power-generating capacity is reflected in Figure 30, which shows consumption of electricity in the province.

FIG. 29

ELECTRIC POWER GRID OF SASKATCHEWAN POWER CORPORATION
- 1958 -



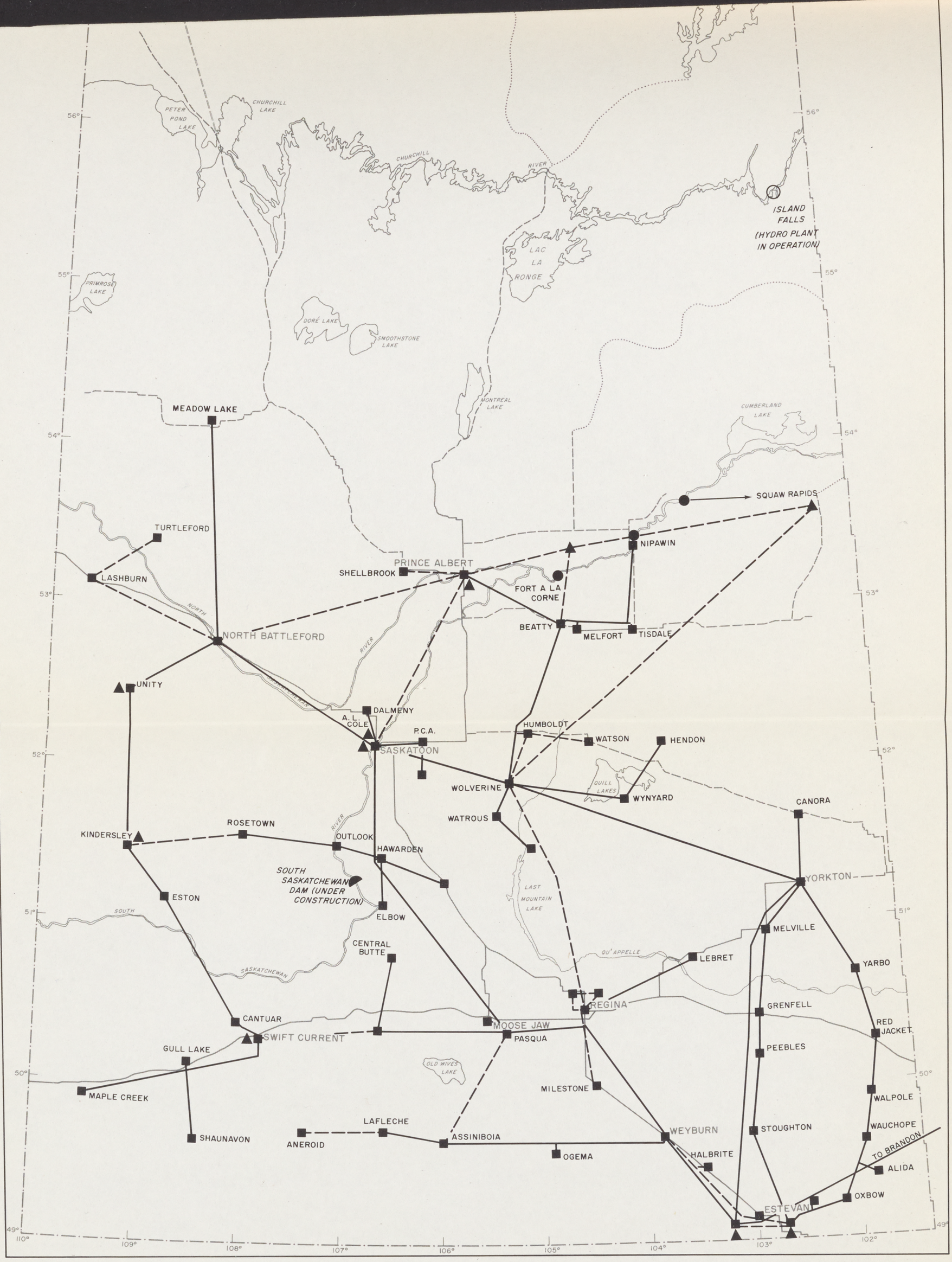
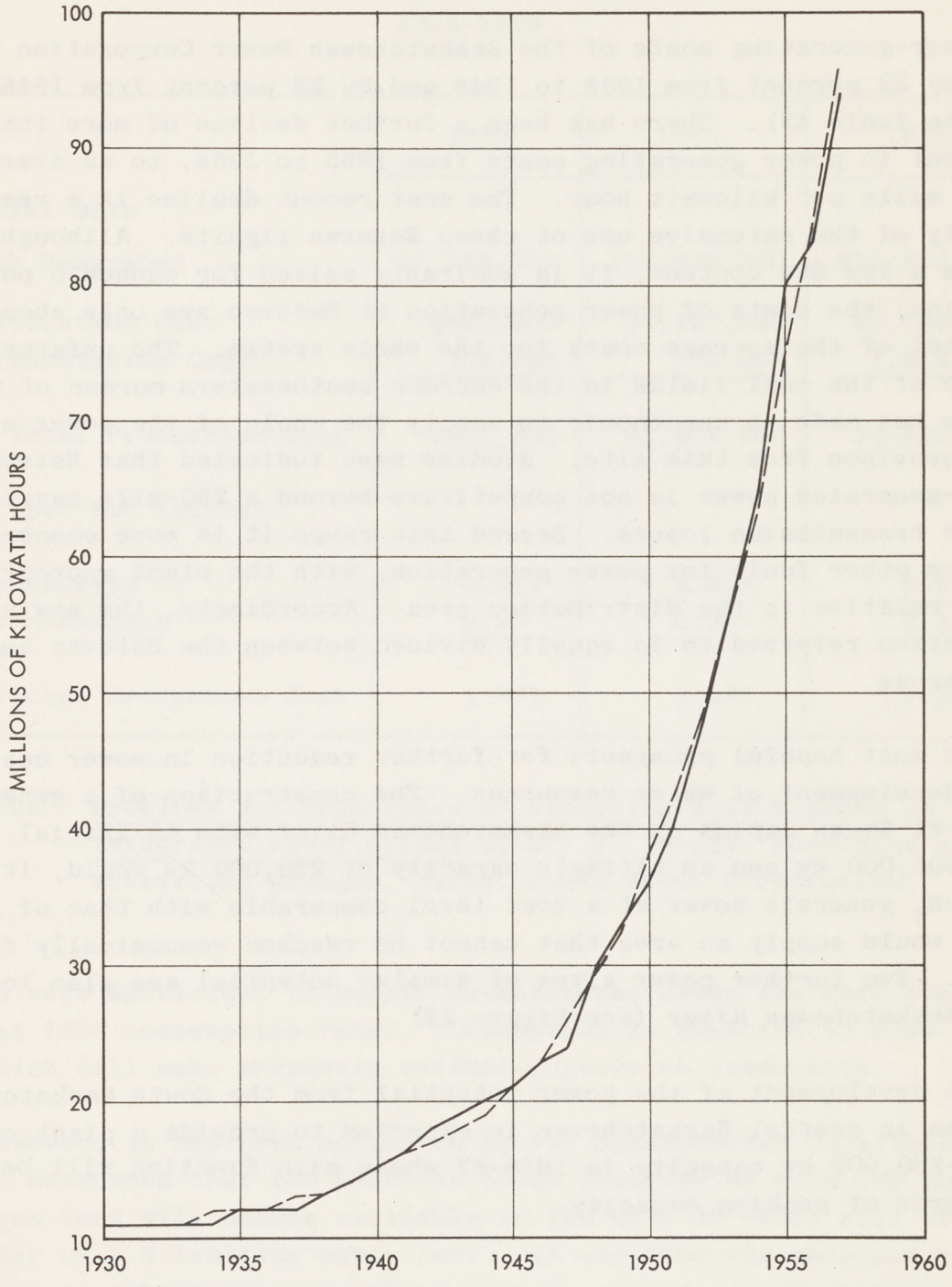

CHURCHILL LAKE
PETER POND LAKE
CHURCHILL RIVER
ISLAND FALLS (HYDRO PLANT IN OPERATION)
LAC LA RONGE
PRIMROSE LAKE
DORÉ LAKE
SMOOTHSTONE LAKE
MONTREAL LAKE
CUMBERLAND LAKE
MEADOW LAKE
SQUAW RAPIDS
NIPAWIN
TURTLEFORD
PRINCE ALBERT
SHELLBROOK
LASHBURN
FORT A LA CORNE
BEATTY
MELFORT
TISDALE
NORTH BATTLEFORD
UNITY
DALMENY
A. L. COLE
P.C.A.
SASKATOON
HUMBOLDT
WATSON
HENDON
WOLVERINE
QUILL LAKES
WYNYARD
CANORA
WATROUS
ROSETOWN
KINDERSLEY
OUTLOOK
HAWARDEN
SOUTH SASKATCHEWAN DAM (UNDER CONSTRUCTION)
YORKTON
ESTON
ELBOW
LAST MOUNTAIN LAKE
MELVILLE
CENTRAL BUTTE
QU'APPELLE
LEBRET
YARBO
REGINA
GRENFELL
CANTUAR
MOOSE JAW
PASQUA
RED JACKET
SWIFT CURRENT
GULL LAKE
PEEBLES
OLD WIVES LAKE
MILESTONE
WALPOLE
MAPLE CREEK
LAFLECHE
WEYBURN
STOUGHTON
WAUCHOPE
SHAUNAVON
ANEROID
ASSINIBOIA
TO BRANDON
HALBRITE
ALIDA
OGEMA
OXBOW
ESTEVAN
SASKATCHEWAN RIVER
SOUTH SASKATCHEWAN RIVER
56°
55°
54°
53°
52°
51°
50°
49°
110°
109°
108°
107°
106°
105°
104°
103°
102°

FIG. 30

CONSUMPTION OF ELECTRICAL POWER IN SASKATCHEWAN
1930 - 1957



SOURCE: Dominion Bureau of Statistics.

During the past three years the Saskatchewan Power Corporation's capacity has doubled, increasing from 161,000 kw in 1955 to 322,000 kw in 1958, and planned capacity is 708,000 kw by 1964. The corporation is prepared to negotiate rates with large users.

Power-generating costs of the Saskatchewan Power Corporation declined by 22 percent from 1938 to 1946 and by 28 percent from 1946 to 1955 (see Table 43). There has been a further decline of more than 10 percent in power generating costs from 1955 to 1958, to an average of about 8 mills per kilowatt hour. The most recent decline is a result primarily of the extensive use of cheap Estevan lignite. Although this coal has a low Btu content, it is admirably suited for economic power generation; the costs of power generation at Estevan are only about 60 percent of the average costs for the whole system. The unfavorable location of the coal fields in the extreme southeastern corner of the province has made it uneconomic to supply the whole of the power needs of the province from this site. Studies have indicated that Estevan's lignite-generated power is not competitive beyond a 250-mile range because of transmission losses. Beyond this range it is more economic to depend on other fuels for power generation, with the plant appropriately located relative to the distribution area. Accordingly, the new plant construction referred to is equally divided between the Estevan and Saskatoon areas.

The most hopeful prospects for further reduction in power costs lie in the development of water resources. The construction of a generating station at Squaw Rapids on the Saskatchewan River with an initial capacity of 200,000 kw and an ultimate capacity of 250,000 kw would, it is estimated, generate power at a cost level comparable with that of Estevan and would supply an area that cannot be reached economically from Estevan. Two further power sites of similar potential are also located on the Saskatchewan River (see Figure 29).

The development of the power potential from the South Saskatchewan River dam in central Saskatchewan is expected to provide a plant of 200,000-250,000 kw capacity in 1966-67 whose main function will be as a source of peaking capacity.

Natural Gas

While natural gas reserves in the province have increased sharply in the last few years, proven reserves are not sufficient at present to meet the expected long-term requirements of the province. Although the estimated recoverable gas reserves of 691 billion cubic feet at the end

Table 43

PRODUCTION COST OF SASKATCHEWAN POWER CORPORATION
AT THREE STAGES OF INTEGRATION
1938-1955

	1938	1946	1955
General Data			
Kwh Generated	51,390,000	118,990,000	556,780,000
Generation Cost	$829,000	$1,497,000	$5,069,000
Transmission Cost	132,000	354,000	1,814,000
Total Production Cost	$961,000	$1,851,000	$6,883,000
Cost per Kwh (cents)			
Generation	1.61¢	1.26¢	0.91¢
Transmission	0.26	0.30	0.33
Total Production Cost	1.87¢	1.56¢	1.24¢

Source: Problems and Principles of Assessing Rate Charges in the Integrated Power System by Dr. P. Woroby, Economics and Statistics Manager, Saskatchewan Power Corporation.

of 1958 were sufficient to supply Saskatchewan needs for more than 30 years at 1958 consumption rates, consumption is expected to rise at a rate which will make presently estimated reserves inadequate.

However, it has been estimated by the Saskatchewan Department of Mineral Resources that the possible total reserves of both dry and oil-field gas that will become available in the next 30 years will be in the order of 2.9 trillion cubic feet. In addition, the abundant supplies available in Alberta can be relied upon to satisfy any Saskatchewan demand that exceeds local supply. Indeed, the Saskatchewan Power Corporation, which has the sole authority to distribute natural gas in the province, has already negotiated a 20-year contract to purchase gas from the Many Islands field in southern Alberta near the Saskatchewan border, and has been using Alberta gas since September 1958.

There has been a rapid extension of natural gas transmission lines in the province since 1952. In seven years the province has moved from a position in which none of the cities had natural gas available to one in which all cities, most towns, and many villages and hamlets are supplied with this important fuel (see Figure 28). This ready access to natural gas in almost any southern area of the province is an extremely favorable factor for industrial development.

Petroleum

The discovery and development of important resources of crude petroleum in Alberta and Saskatchewan, and to a considerably lesser extent in Manitoba, have been of great significance to users of fuel. These developments have brought the price of crude petroleum and products down considerably. The Prairie Provinces were previously in a net import position, and price was determined primarily by the price prevailing in the major United States oil fields and transport costs to the Prairie region. Now that the Prairie region is in a net export position, the price of crude petroleum is determined by that prevailing at the point in Ontario where Prairie petroleum is competitive with United States petroleum, less transport costs from the Prairie region to that point.

Thus a considerable price advantage of interest to both individuals and industry has been realized since 1949, when petroleum from the Prairie region was first exported in quantity through the Interprovincial pipeline.

Present and potential reserves of crude petroleum and the supply and availability of petroleum products is discussed in Section V.

Coal

Another factor of some significance in Saskatchewan is the large reserves of a type of coal adaptable for certain industrial purposes and particularly for generating power. Probable minable reserves of coal total some 6.5 billion tons. Somewhat more than half the coal reserves are in the Estevan area, where extensive strip mining is in operation.

Coal production in Saskatchewan has been increasing, contrary to the general pattern of a declining coal mining industry in the rest of Canada. For instance, while in 1953 Saskatchewan coal production was 2.0 million tons in relation to 13.9 million for the rest of Canada, in 1958 it stood at 2.3 million tons as compared to 9.4 million tons for the rest of Canada.

Saskatchewan coal has low caloric content (7,000 Btu per pound) and accordingly cannot be economically transported long distances although some has moved into Manitoba and even into western Ontario. The major factor limiting its use on a large scale throughout the province is transportation costs.

Water and Sewerage

A critical factor in parts of Saskatchewan is the water supply. Several of the cities and towns are built at considerable distances from adequate sources of water; a number of Saskatchewan cities are presently supplied with water of only fair quality or with an insufficiently assured supply (see Table 44). This situation would create difficulties in these centers for industries dependent upon large supplies of water.

Of the 107 urban centers with populations of between 500 and 4,900, all except 47 have sewerage systems in operation or pending, 23 have adequate water supplies, 4 have water systems under construction, 16 have inadequate or uncertain water systems, and 54 have no water systems. The completion of the South Saskatchewan Dam will create a reservoir holding more than 2,100 billion gallons of water and will do a great deal to assure supplies to some of these cities. Moose Jaw and Regina, in particular, would benefit from this project.

Public and Official Attitude toward Industry

In general, the public attitude toward industry may be regarded as extremely favorable. It has been recognized, at least since the depression of the 1930's, that some diversification of production in Saskatchewan would be highly desirable to cushion effects of a similar occurrence and generally increase the welfare of the provincial population. Diversification has taken place in agriculture (see Section III), but this has been limited by climate and markets. Thus, the development of resources other than agriculture and expansion of manufacturing industries have received considerable public support.

Naturally this support has been stronger in the urban areas where benefits of industrial developments are more directly felt. With increasing industrialization in the province it is expected that there will be an increasing public awareness of the importance of industry and of the benefits that can accrue to a community as a result of industrial development. The official attitude toward industry may be gauged by the services and concessions, offered by municipal and

Table 44

WATER SUPPLY IN SELECTED CITIES
IN SASKATCHEWAN WITH POPULATIONS OF OVER 5,000

City	Local Services Required	Water Supply			
		Source	Quality	Adequacy	Potential Assured Source
Regina	Trunk and feeder main	Wells and reservoir	Fair	Adequate	So. Saskatchewan River
Saskatoon	Trunk water and sewer mains	So. Saskatchewan River	Good	Adequate	So. Saskatchewan River
Moose Jaw	Trunk water and sewer mains	Surface reservoir	Fair	Adequate	So. Saskatchewan River
Prince Albert	Trunk water and sewer mains	No. Saskatchewan River	Good	Adequate	No. Saskatchewan River
Swift Current	Storage	Swift Current Creek	Good	Adequate	Swift Current Creek
North Battleford	Feeder mains	Wells	Fair	Limited	No. Saskatchewan River
Weyburn	Feeder mains and trunk sewers	Souris River	Fair	Adequate	Souris River
Yorkton	Feeder mains	Wells	Fair	Limited	Qu'Appelle River
Estevan	Surface reservoir	Long Creek	Fair	Questionable	Souris River
Lloydminster	Storage	Wells	Poor	Inadequate	Sandy Lake
Melville	Sewage treatment	Wells and surface	Fair	Questionable	Qu'Appelle River

Source: Department of Health, Government of Saskatchewan.

provincial authorities, which are designed specifically to attract industry by creation of favorable conditions. The official policy has been reviewed in Section III, where it was noted that the policy is directed toward industrial development carried out by any or all of three types of organizations: private corporations, cooperatives, and government.

This discussion is oriented mainly to the consideration of location factors that influence the decision of a private industrialist. Thus, official activities that favor or foster development of cooperative and government enterprises in fields competitive with private enterprise are obviously unfavorable location factors. (For government, either municipal, provincial, or dominion, seeking maximum industrial development, the aim is to find the optimum balance between the three sources of development capital and control.)

At the municipal level the regulations, services, or concessions are similarly designed to favor development, although they vary considerably with the municipality. Zoning has been discussed above in the section on availability of industrial sites. One indication of a city's attitude is the activity shown in promoting industry. In a number of the larger cities, the city government cooperates with the chamber of commerce in promoting industrial development. However, in most cities and towns the local chamber of commerce or board of trade carries out promotion. With the exception of Regina and Saskatoon, the remaining cities are not in a financial position to undertake extensive programs of promotion in the form of advertising, research, entertainment, and contacting prospective industrialists. Thus, in many areas of promotion is restricted to incidental activities.

At the provincial government level there are a number of important policies and services which have bearing on industrial location, particularly activities of the Industrial Development Fund, the Industrial Development Office, Saskatchewan Research Council, the Departments of Labour, Mineral Reserves, and Natural Resources, and Crown Corporations. These services were discussed in Section III.

Taxes

The major taxes and tax rates which apply in Saskatchewan are shown in Table 45.

Table 45

MAJOR TAXES AND TAX RATES IN SASKATCHEWAN
1958

Category	Title of Act	Legal Citation	Basis of Measurement of Tax	Tax Rate	Comments, Exemptions, etc
General Sales	Education and Hospitalization Tax Act	R.S. 1953, c. 61	Retail price	3%	Exemptions are allowed on food and drink (nonspirituous), drugs, orthopaedic appliances, hearing aids, dentures, farm machinery, gasoline used for agricultural purposes, fishing nets and land. Meals are not taxed.
Race Meetings	Horse Racing Regulation Act	R.S. 1953, c. 349	Pari-mutuel betting pool	5%	
Motor Fuel	Fuel Petroleum Products Act	R.S. 1953, c. 62	Per gallon	12¢	Exemptions are allowed for farm services, aviation, road machines within a municipality, used in manufacturing processes, licensed commercial fisherman, coal mining equipment.
Hospital Insurance	Health Services Act	R.S. 1953, c. 231	Annual personal or family charge	Adult $20.00 Child under 18 years 5.00 Maximum per family 45.00	
Fire Insurance	Fire Prevention Act	S. 1954, c. 85 S. 1957 c. 92	Premium income	1%	
Insurance	Insurance Premium Tax Act, 1957	S. 1957, c. 23	Premium income	2%	Exemption for marine insurance and annuity contracts.
Mining Operations	The Mineral Resources Act	R.S. 1953, c. 47	Income	3% on amount over $10,000 to $100,000 5% " " " $100,000 to $500,000 7% " " " $500,000 to $1,000,000 12 1/2% " " " $1,000,000 or 5% of the market value of mineral content of ore sold during such calendar year (whichever is the lesser).	These rates apply only to quartz mining and to mines commencing or recommencing operations after January 1, 1947. Mines in operation prior to January 1, 1947 will pay the same rate that is given for profits in excess of $1,000,000.
Automobiles	Vehicles Act	R.S. 1953, c. 344	Wheel base	Not exceeding 110" - $10.00 Exceeding 110" but not 120" - 15.00 Exceeding 120" - 20.00	Expiration date March 31.
			Operator	$1.00	

Source: Government of Canada.

Summary

Saskatchewan is richly endowed with a wide variety of natural resources, many of which are likely to be in considerable demand both in North America and throughout the world. In addition, it is in the center of the growing Prairie market. In view of these conditions the province appears to have considerable promise as a location for industry.

In appraising the factors governing the location of industry in Saskatchewan the following are important in favoring development:

1. A steady and substantial growth is expected to continue in local markets, both in Saskatchewan and the other Prairie Provinces. The Saskatchewan population is estimated to increase over 1958 by about 50 to 60 percent by 1981, and the total Prairie Provinces by 40 to 70 percent in the same period.

2. The abundance of raw materials in the province in the form of minerals, forests, and agricultural products is highly conducive to the location of important large-scale associated export industries and service industries.

3. There is an abundant labor supply, and due to the high degree of motorization, particularly in rural areas, plants locating in relatively isolated areas (for proximity to raw materials) can expect to draw a substantial labor force from the surrounding area. In addition to a supply of labor, labor-management relations are good, and the Department of Labour is very active in the field of conciliation.

4. There is a favorable public and official attitude toward industry. The importance of diversification of the economy has long been recognized, as evidenced by the encouragement given to the industrial sector. This has been particularly true since the depression of the 1930's, which was particularly severe due to the almost exclusive dependence upon agriculture.

5. Industrial fuel and power are readily available. The province is well situated to supply low-cost fuel oil and natural gas, either from local wells and refineries, or from border areas in Alberta. Generation of electric power is under the control of the Saskatchewan Power Corporation, which provides power at or near cost to all centers in the province and in quantities adequate to meet any industrial need.

6. Good local transportation facilities are available. All major centers in the province are connected by paved highways. There is also a highly developed rail network and good air services to large cities; the tourist and mining areas in the north are serviced by four airlines.

7. Living conditions in most Saskatchewan communities are good. Several of the larger cities have well-developed programs for urban development. The province has excellent health services and educational facilities, and there is abundant opportunity for recreation, particularly in the northern regions.

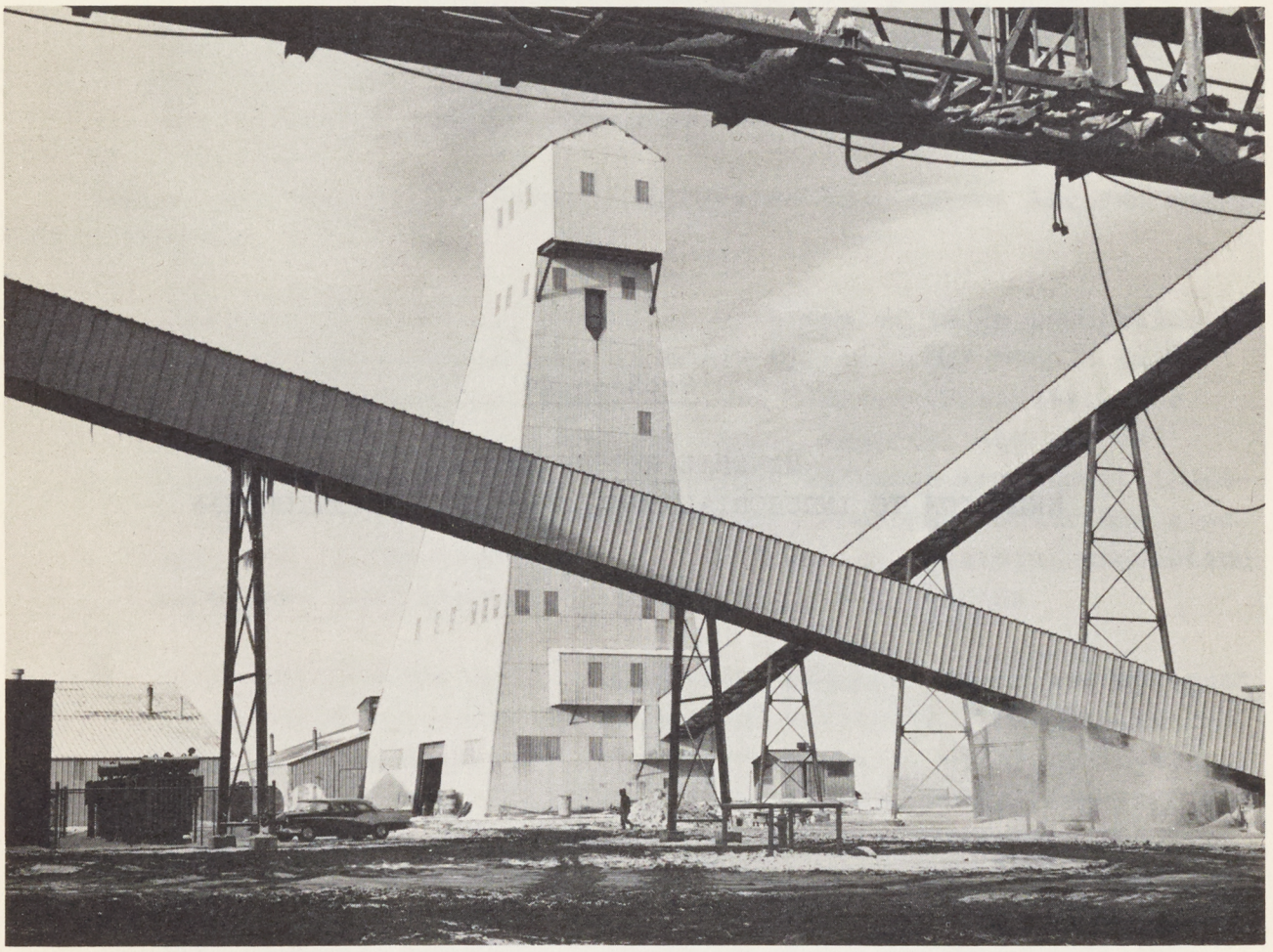
Offsetting the above favorable factors to some extent are two major disadvantages:

1. Transportation to and from the ports and to large population and manufacturing centers of North American has been a major factor retarding development of the Canadian Prairies. The distances involved in reaching export markets, and the exclusive dependence on rail, have put Saskatchewan export industries at a competitive disadvantage. The same factor has also operated to the province's disadvantage in obtaining production machinery and materials from manufacturing centers.

2. It is the opinion held by some nonresidents, in marked contrast to opinions expressed by many local residents, that Saskatchewan is a comparatively undesirable place in which to live from the point of view of climate. This largely stems from lack of knowledge about the province by people from outside. The winter climate is certainly unfavorable, but no more so than that of many areas of North America which have experienced considerable industrialization. Another factor contributing to this reputation is the unattractive appearance of some of the towns in Saskatchewan, and lack of enthusiasm for industrial development at the municipal government level in some smaller communities.

Section V

MINERAL RESOURCES IN RELATION TO INDUSTRIAL DEVELOPMENT OF SASKATCHEWAN



Potash Company of America's Plant at Patience Lake, Saskatchewan

SASK. GOV'T PHOTO

Section V

MINERAL RESOURCES IN RELATION TO INDUSTRIAL DEVELOPMENT OF SASKATCHEWAN

It was observed in Section III that industrial development based upon the resources available in Saskatchewan provides the best means for the economic advancement of the province. This section deals with the nonrenewable resources. For each important mineral there is a discussion of the geological background and an examination of the industrial potential, after due consideration of supplies available, accessibility, and markets. Mineral resources are subdivided into (1) metallic minerals, which occur mainly in the Precambrian area and comprise known resources of uranium, copper, zinc, cadmium, selenium, tellurium, platinum, gold, silver, lead, nickel, and iron; (2) industrial minerals, which occur exclusively in the sedimentary region and comprise known deposits of potash, sodium sulphate, sodium chloride, clays, sand and gravel, bentonite, pumicite, limestone and marl, silica sand, magnesium, and helium; and (3) fuel minerals, which also occur exclusively in the sedimentary region, and comprise petroleum, natural gas, and coal (lignite).

The Province of Saskatchewan is fortunate in having developed varied mineral resources, and has an excellent potential for widening the scope of its mineral production. The surface geology can be broadly subdivided into the Precambrian shield of the northern third of the province and the later sediments of the southern two-thirds (see Figure 31).

Metallic Minerals

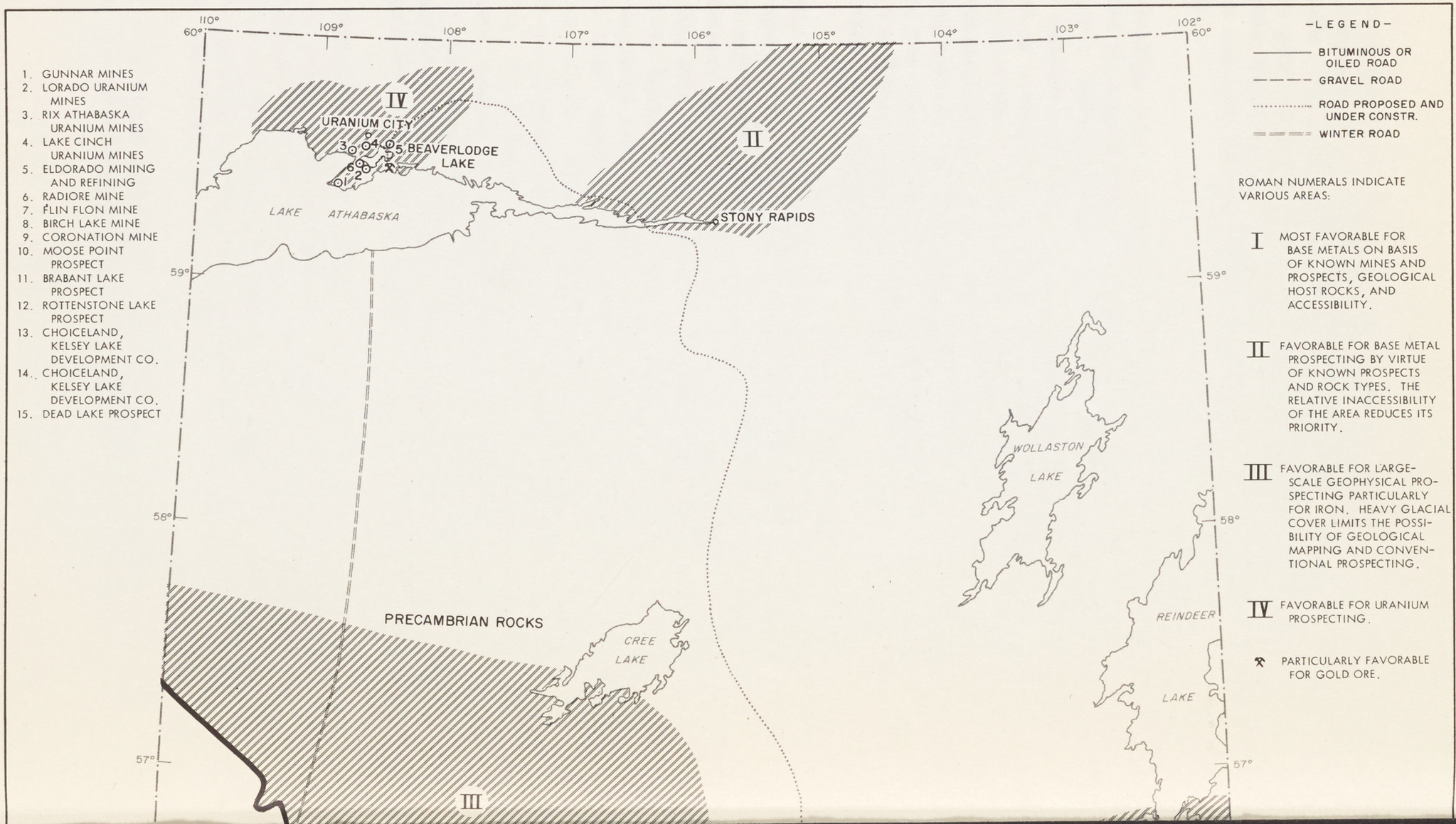
Saskatchewan's metal production now comes largely from the uranium mines around Beaverlodge on Lake Athabaska (1958 production estimated at $59 million), and from the Hudson Bay Mining Company's mine at Flin Flon.

The Precambrian region covers a wide area and includes many geological formations. The entire area needs much additional geologic mapping and mineral exploration, but from the knowledge available, the potential for finding additional metal deposits is believed to be excellent. The four areas designated in Figure 31 as being most favorable for prospecting are marked in decreasing order of favorability. These areas were selected because they show indications of favorable geology, are relatively accessible, and have, in part, been geologically mapped in some detail.



FIG. 31

PRECAMBRIAN MINERAL RESOURCES OF SASKATCHEWAN



PRECAMBRIAN ROCKS

I

SEDIMENTARY ROCKS

SEDIMENTARY ROCKS

CHURCHILL LAKE

PETER POND LAKE

CHURCHILL RIVER

LA RONGE

LAC LA RONGE

PRIMROSE LAKE

DORÉ LAKE

SMOOTHSTONE LAKE

MONTREAL LAKE

FLIN FLON

AMISK LAKE

CUMBERLAND LAKE

THE PAS

LLOYDMINSTER

PRINCE ALBERT

NORTH BATTLEFORD

NORTH SASKATCHEWAN RIVER

UNITY

SASKATOON

COLEVILLE

SMILEY

SOUTH SASKATCHEWAN RIVER

QUILL LAKES

LAST MOUNTAIN LAKE

YORKTON

QU'APPELLE

REGINA

MOOSE JAW

SWIFT CURRENT

HATTON

OLD WIVES LAKE

CYPRESS HILLS

EASTEND

SHAUNAVON

WEYBURN

ESTEVAN

12 11 15 10 7 8 9 13 14

56° 55° 54° 53° 52° 51° 50° 49°

110° 109° 108° 107° 106° 105° 104° 103° 102°

The area considered to be most favorable for mineral discovery is that which is embraced in a V-shaped loop between Flin Flon, La Ronge, and Reindeer Lake. In this relatively accessible area, the rocks are not obscured by glacial drift or later sedimentary rocks, and there has been considerable exploration. In addition, the area is near known deposits and also contains an abundance of mineral occurrences (see Figure 31, Area I).

Topographically, Area I consists of irregular hummocky hills and ridges separated by depressions, the majority of which are occupied by lakes and muskegs. Rock outcrops are numerous and the shores of lakes consist almost entirely of rock. From the geological standpoint, the area is covered by a complex of sedimentary and volcanic rocks interspersed by granite rocks. Basic rocks appear here and there, invading the volcanic and sedimentary rocks in forms of rather small, often irregularly shaped masses. In this particular area, these rocks appear quite favorable for mineral deposits. Throughout there is considerable pyrrhotite with concentrations in various locations of pyrite, chalcopyrite, sphalerite, and arsenopyrite.

Anglo-Rouyn holds a property at Moose Point on the north shore of Lac La Ronge reported to contain 2,500,000 tons of 1.95 percent copper plus minor gold and cobalt values. At Brabant Lake, 95 miles northeast of La Ronge, Westore Mines Ltd., is reported to hold claims estimated to have 5,750,000 tons averaging 0.58 percent copper and 4.87 percent zinc. Immediately north of Dead Lake, 30 miles north of Lac La Ronge, lead and zinc sulphide mineralization has been discovered over a strike length of 9,400 feet, samples of which are reported to contain high lead, zinc, and silver values. At Rottenstone Lake, 70 miles north of Lac La Ronge, a 50,000-ton deposit high in copper, nickel, and platinum values has been located. This occurs in a small pod of basic rocks found in an area underlain largely by granitic gneisses. In itself, this deposit is too small to have importance. However, an airborne magnetic survey of the area indicates large bodies of similar basic rocks nearby which may contain important deposits of copper, nickel, and platinum ore.

The area considered to be second most favorable for base metal prospecting lies north of Stoney Rapids. The terrain is similar to that around La Ronge, but the relative inaccessibility of Area II reduces its chances of more detailed mapping and exploration in the near future. When completed, the La Ronge-Uranium City road should assist considerably in rectifying this situation.

The third area which appears to offer promise is that between the Churchill River and Cree Lake extending to the Alberta border (see

Figure 31). Despite the fact that glacial cover imposes limitations on geological mapping and conventional prospecting, there appears to be definite evidence of mineral deposits, particularly iron. Area III appears to be part of a belt of similar rocks that stretches across the province to Reindeer Lake and north along Wollaston Lake.

The remaining area with good potential for mineral discovery is the uranium region (Area IV) around Beaverlodge on the northern shores of Lake Athabaska, with terrain similar to that of the Stony Rapids region.

In the remainder of the Precambrian area, favorable rock types appear to be relatively rare; however, insufficient information has been obtained to indicate its ultimate potential.

An area of more than 20,000 square miles, extending from Lake Athabaska south to Cree Lake, and from the Alberta border east to Wollaston Lake, is underlain by the Athabaska Series consisting largely of sandstone. This formation is gently dipping, and estimated to reach maximum thicknesses of approximately 1,000 feet. It effectively covers the underlying rocks, and is thought to have little merit as a source of base metals. However, even here, modern geophysical exploration techniques might eventually disclose favorable exploration targets beneath the unfavorable rocks. The rocks containing the uranium deposits, north of Lake Athabaska, project under this area.

A structure favorable for mineralization extends through central Manitoba along a southwesterly trend. This is the contact line between two major geologic units, the Athabaska to the northwest and the Keewatin to the southeast. Major nickel deposits have been located along this trend in Manitoba at Moak Lake and Thompson. The same structure projects into Saskatchewan in the Precambrian under the sediments, probably near the line of the Saskatchewan River. Perhaps the Choiceland iron deposits are on this trend. All available information which would serve to locate this structure, such as magnetic and gravity data, should be analyzed and the resulting information publicized to encourage its exploration. Even though the structure is at depths below the later sediments, favorable geophysical anomalies should be explored, as is being done at Choiceland.

In summary, Saskatchewan has a tremendous Precambrian mineral potential. However, based on the over-all Precambrian area in the province, Saskatchewan would appear to be somewhat less favorably endowed than Manitoba, and considerably less than Ontario or Quebec. Conversely, Saskatchewan has a relative abundance of favorable rock types per unit of Precambrian, so that the over-all favorability for mineral exploitation is perhaps more nearly comparable with that of the other provinces.

Uranium

Despite its very recent development, uranium now ranks first among Saskatchewan Precambrian minerals, with an estimated value of production of $59 million in 1958.

The uranium area is located in northwestern Saskatchewan north of Lake Athabaska around Beaverlodge Lake (Figure 31). It is accessible for heavy equipment and bulky supplies by river tug and barge during the summer months via the Athabaska River from the end of the railroad at Waterways, Alberta. All-year transportation is provided to this area by air for personnel and light freight from Prince Albert and from Edmonton, both approximately 450 miles distant.

Pitchblende was first discovered in Saskatchewan north of Lake Athabaska in 1935, but there was little interest in it until the development of the atomic bomb during World War II placed a premium upon the exploitation of uranium sources. The deposits were reinvestigated in 1944 and claims were staked by the federal Crown Corporation, Eldorado Mining and Refining Company, which had a monopoly in uranium development in the Northwest Territories. Continuing exploration was climaxed by intensive activity in 1952 and 1953, when more than 22,000 claims were staked. Production began in 1953. The value of production rose from $11 million in 1954 to $43 million in 1957 and to approximately $59 million in 1958. Production in 1959 should be on the order of 2,800 tons, valued at about $57 million.

There are three mills in northern Saskatchewan, with a total rated capacity of 4,350 tons of ore per day, processing pitchblende ore into the oxide form of uranium which is then sold to the United States and United Kingdom atomic energy authorities.

The uranium deposits are found largely in or near shear zones in strongly metamorphosed sedimentary and volcanic rocks of the Tazin group, which contain much hornblende, biotite, and chlorite. However, the Gunnar mine consists of pitchblende and uranophane disseminated in a brecciated syenite.

As is typical of mining operations, uranium reserves are in several different categories, ranging from proven reserves to others where the possible extent of ore resources has not been definitely established. Proven reserves stand now in the neighborhood of 6.6 million tons of 0.20 percent U_3O_8 ore; the potential for development of additional reserves appears excellent, particularly by extension of presently known deposits (see Table 46).

Table 46

URANIUM RESERVES IN NORTHWESTERN SASKATCHEWAN
January 1959

Company	Tonnage (thousands)	Grade (percent)	Estimated Ore Production[1/] 1958 (tons/day)
Eldorado Mining and Refining	3,500	0.21%	2,000
Gunnar Mines, Ltd.	2,550	.19	2,000
Lake Cinch Mines, Ltd.	77	.22	190
Lorado Mines, Ltd.	9	.25	750[2/]
Radiore Uranium Mines	422[3/]	.17	
Rix Athabaska Uranium Mines, Ltd.	40	0.22	300
Total	6,598		

1/ Production can exceed rated capacity of mills.
2/ Custom Mill.
3/ Eldorado Mill.

Source: Government of Saskatchewan, Department of Mineral Resources, Mines Branch.

Discoveries of new mines will be more difficult because of the earlier intensive exploration. However, careful geologic mapping and more thorough exploration should reveal more deposits of economic importance.

Saskatchewan uranium mining should be able to maintain its competitive position. Inaccessibility of the area is responsible for the high initial development costs and for the continuance of relatively high mining costs. However, with a U_3O_8 content of the ore twice that of Blind River deposits, mines like Gunnar should be able to compete with most of the other mines in Canada.

The Saskatchewan Research Council at Saskatoon has been investigating methods of upgrading low-grade uranium deposits found in pegmatites. It is understood that this work is being suspended because the immediate potential of using such low-grade deposits appears to be very poor.

Canada has had very little uranium exploration activity since 1955 (except for extensions in active mining areas) as the result of the government's announcement that new contracts would not be considered after March 31, 1956. However, producers have a guaranteed market until 1963. Canadian mining companies have been actively searching for nongovernment or foreign markets to absorb their production as present contracts expire. In view of this situation, the outlook for international uranium markets and development of nuclear power is of paramount importance to producers of one of Saskatchewan's most valuable minerals.

Development of Commercial Uses for Nuclear Energy

In 1942, when the first controlled fission reaction took place, the world was on the threshold of one of the most revolutionary developments in energy. Since that time, giant strides have been made in the application of this new energy source, although initially the primary effort went into the field of military use. However, the peaceful uses of nuclear energy are being explored more deeply and major nuclear power programs are now under way in many countries.

The successful demonstration of the fission process and the military demand for uranium led to an intensive search for, and development of, uranium sources. Indeed the concerted efforts of governments and industry in Canada, the Union of South Africa, the United Kingdom, and the United States were necessary in order to overcome the possibility of a shortage of fissionable materials. However, today the Free World is in a strategically sound position with regard to supplies of

fissionable materials, both in terms of productive capacity and in terms of reserves; there is no longer any concern about possible shortages of uranium for military purposes. In addition, the low-cost uranium resources which have been developed offer security for the future nuclear power needs of the world.

Unfortunately, progress in commercial nuclear power technology has not matched progress in uranium development. There is no question, therefore, that a uranium surplus will exist for some time after the guaranteed purchase program for military needs expires, or at least levels off. How long a time this will be true is difficult to estimate, but the fact that there will be a surplus could well mean the difference between economic success or failure for many in the uranium mining industry.

The time in the future at which nuclear power will become economically competitive is conditioned not only by progress in the field of nuclear technology but also by trends in other sources of energy supply. Technical progress in nuclear energy has been impressive. The major nuclear power programs now in progress are being directed generally in accordance with needs that will exist in the future. The limitations of nuclear energy and its probable achievements are being defined better today than at any time in the past. This means that the future requirement for nuclear fuels can now be assessed with more confidence than was possible a year or two ago.

Uranium Use Rate

Estimates of future nuclear fuel demand must still be based on an array of assumptions which individually are amenable to logical determination but collectively create an error potential of large magnitude. Such estimates must therefore be used carefully.

Possibly it is best to first establish a nuclear fuel use factor related to the first few generations of nuclear power plants expected to be put into operation. Generally speaking, these reactor types are the concepts that are now most fully developed and that will probably represent the large majority of nuclear power facilities for the remainder of this century. Nine large reactor plants of about 150 electrical megawatt (MWe) capacity each have been proposed for construction in Italy. An analysis of the fuel requirements of these plants (covering the four most highly developed concepts) indicates that an average inventory of 1.3 metric tons natural uranium metal per net MWe of generating capacity is planned. On the average, the fuel inventory of such reactors will have to be replaced every three to four years. In

other words, each MWe of installed capacity will require an annual supply of the equivalent of 0.4 metric tons of natural uranium for replenishment only.

A portion of this supply will be derived from fissionable material produced in the reactor and through recovery of unburned fuel remaining in the original inventory when it is withdrawn from the reactor. The balance will have to be made up of supplies of fresh uranium produced from newly mined ore concentrates. Although what quantity of uranium will be needed is certainly a critical factor with respect to future mining operations, it is one of the most difficult to assess at the present time. The highest estimate which can be justified for the early reactor systems is about 50 percent of total replenishment; that is, the annual new natural uranium metal requirement should be in the order of 0.2 metric tons per MWe.

It is reasonable to assume that the annual uranium inventory requirements will necessitate a rather steady supply. This results from holdups throughout the nuclear fuel cycle at all steps from mining through milling, enriching, fabricating, "cooling," and reprocessing. Early in commercial reactor development this pipeline might well equal reactor inventories in magnitude. As total nuclear power capacity increases to more significant levels, this factor could probably be reduced to one-fourth of inventories in reactors. Assuming the early case, each MWe of nuclear capacity in these early plants is estimated to require a new supply of up to 2.6 metric tons of natural uranium in the reactor and the pipeline, and that an annual consumption of 0.2 metric tons will result. Equivalent mill concentrate figures would be 3.4 short tons in the reactor and in process, and 0.25 short tons annual consumption of U_3O_8.

A recent publication by the OEEC, European Nuclear Energy Agency,[1/] indicates considerably lower inventory and process requirements and slightly higher consumption rates, based on an analysis of nuclear power facilities contemplated for OEEC nations during the next five years. Sir John Cockroft of the United Kingdom has estimated a unit consumption rate in 1970 of about one-half that derived here. These differences fall well within the range of possible estimates produced by varying the assumptions.

1/ Estimates of Nuclear Energy Production in Europe, 1958-1965. European Nuclear Energy Agency of the Organization for European Economic Co-operation, May 1959.

Free World Uranium Supply

The Free World's three major uranium-producing countries, Canada, South Africa, and the United States, now have stated reserves of 380,000, 370,000, and 220,000 tons of U_3O_8 respectively. The 1958 production from these reserves was approximately 32,000 tons, an increase of 55 percent over the previous year. The increase in 1959 will be about one-half the former rate, and world production is expected to level off at an annual figure of about 40,000 tons of U_3O_8 for at least the next three years.

Many artificial factors influence the current uranium situation. Present proven reserves and ore production capacity have been developed under a government-sponsored program of guaranteed purchases. These guarantees expire in the period between 1962 and 1966. Military needs alone support the current uranium industry at a cost of about $700 million per year. The certainty of a continuing military market at the present level is questionable indeed. Instead, it appears quite likely that, short of all-out war, military demand could very well drop to one-half the present figure. Recent United States Atomic Energy Commission data[1/] indicate that AEC purchases of U_3O_8 will have dropped from a high of 36,000 tons per year in 1961 to 20,000 tons in 1965. It has also been stated that current AEC purchases are in excess of need and will continue to be in excess for the next few years, indicating a current stockpiling situation.

It would appear, then, that U_3O_8 availability for commercial purposes in 1965 will be 20,000 tons per year at a minimum, assuming 1959 producing capacity. From the earlier analysis, this would represent the ability to fuel a minimum of 6,000 MWe of new nuclear power capacity per year.

At the present time, Canadian and United States uranium producers are essentially in an equal competitive position: proven reserves are not too different, mining costs are probably fairly close, and potential improvements in both countries appear similar. South Africa's production, however, is purely a "by-product" operation related to gold production and cannot be assessed in the same manner.

Both Canadian and United States operators are in the fortunate position of being able to charge off almost all of their investment

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1/ AEC's Uranium Procurement--Domestic and Foreign, by Jesse C. Johnson, Director, Division of Raw Materials, USAEC, April 17, 1959.

against firm contracts. All Canadian contracts with the United States AEC (which account for practically all the country's volume) expire before March 1963, while some United States producers have contracts running into 1966. In any case, producers in both countries have about the same opportunity to participate in a commercial market on an equal and competitive basis.

United States operations might have a small edge, in that United States ore values are higher than Canadian, in the order of 5 to 6 pounds of U_3O_8 per ton of ore. The Beaverlodge area in Saskatchewan is an exception, with values similar to those in the United States, rather than the 2 pounds per ton figure which is the case in nearly all the remaining Canadian reserves. If competitive position is determined, partly on the basis of high ore values, Saskatchewan would certainly be in a favorable position.

Future Free World reserves do not appear to be lacking. It has been estimated[1/] that current reserves could be doubled to 2 million tons of U_3O_8 by extensions in current bodies and new discoveries in current producing areas. Additions to this amount which could be produced at a cost equivalent to today's might equal another 2 million tons. This total represents 100 years of production potential at the 1959 rate. If costs up to six times those of today were acceptable, total reserves of U_3O_8 might be increased to 20 million tons.

Nothing has been said here of the effect of demand locations on potential supply areas. In the case of uranium concentrates, the problem of transportation tends to be of minimal importance. Values of U_3O_8 are sufficiently high, and further value added in subsequent fuel manufacturing and reprocessing is so large relative to raw material value, that, in general, no supply area in the world is at any competitive disadvantage as a result of its location.

It does not seem at this time that the price of U_3O_8 will have very significant effects on the eventual cost of nuclear power. Current contract prices are in the range of $9 to $10 per pound of U_3O_8. Long-term contracts have been written at a price of $8 which appears to be a fairly firm base price at this time. All supply areas could probably compete within such a price structure. In an oversupply situation it

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1/ Robert D. Nininger, Assistant Director for Exploration, Division of Raw Materials at the AEC, Washington, D.C., November 10, 1958.

is inevitable that concentrate prices will decline, some estimates being as low as $4. In such a market much of the current production capacity could not compete, and it is expected that only those properties having relatively high ore values and the opportunity to conduct selective mining procedures on an economic basis will be able to participate. Those having low ore value but highly efficient mining and processing operations may also participate to a lesser extent.

After the oversupply period, and as demand begins to approach and then exceed current production capacity, it is expected that concentrate prices will again rise, probably to the $8 level. As previously stated, however, this price fluctuation will have no significant effect on the eventual cost of nuclear power.

Possible Demand for Uranium

As already mentioned, the need for uranium per unit of nuclear power capacity is potentially in the order of 3.4 tons of U_3O_8 per MWe. It has been noted that the minimum U_3O_8 production in 1965 will be capable of fueling a minimum of 6,000 MWe of capacity annually. It appears that maintaining current U_3O_8 production rates at costs equal to or less than present is possible for up to 100 years in the future.

How do these factors relate to future demand? Recent estimates[1/] of possible nuclear power use in Europe predict that about 9,000 MWe will be in use in 1965 with additions being made at that time at an annual rate of about 2,500 MWe. A fivefold increase in installed capacity might come about in the following ten-year period, and by 1975 additions might be made at the rate of 7,500 MWe annually.

In the United States, predicted growth of nuclear power is considerably slower, reaching only 3,000 MWe in 1965, and a maximum of 25,000 MWe in 1975. Annual additions in those years will be on the order of 500 and 5,000 MWe, respectively. All other Free World countries will probably no more than equal the United States estimates.

On the basis of these predictions and earlier assumptions, estimated annual U_3O_8 requirements in 1965 and 1975 can be derived. The

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1/ Estimates of Nuclear Energy Production in Europe, 1958-1965, European Nuclear Energy Agency of the Organization for European Economic Co-operation, May 1959.

result is that in 1965, less than 14,000 tons of U_3O_8 will be required annually to fuel new nuclear power capacity and to replace consumed fuel. By 1975, however, the requirements will be six times as large, or about 85,000 tons per year. It is estimated that it will not be until after 1967 that nuclear power demand will equal the 20,000-ton availability cited earlier. Shortly after 1970, however, the demand will begin to exceed today's total production capacity of 40,000 tons per year. In later periods, it is expected that the growth in demand for U_3O_8 will begin to slow down as advanced reactors are installed, fuel cycle efficiencies are improved, and the benefits of larger volume activity begin to take effect. The next five to seven years should be of concern to uranium producers as far as an oversupply situation is concerned. Undersupply will be the major problem in the years to follow.

Impact of Uranium Demand on Saskatchewan

Uranium production in the province is firmly established on the basis of well-defined reserves, efficient mining operations, and contractual agreements for at least the next two years. After early 1962, relatively large quantities of uranium production in the province and, in fact, in the dominion, will become available for commercial use. It appears that the product mined in Saskatchewan will be able to compete favorably in the small market which will exist at that time. However, it does not seem probable that all available production will be needed. The province will enter the improved commercial market in the late sixties in a favorable position, and at that time can look forward to selling a much larger portion of production capacity. In the seventies, production capacity will have to be expanded and producers can look forward to a high demand for their product. Before that time it would seem prudent to explore further for additional uranium in the Beaverlodge area, and to begin surveys of the many favorable uranium occurrences in the north-central area of the province. The continued and increasing demand for uranium in future years offers promise of many years of profitable exploitation of this new and important source of energy.

Copper

Next to uranium, copper is Saskatchewan's most valuable product among the metals. Up until the present time, mining has been concentrated around the Flin Flon area where the Hudson Bay Mining and Smelting Company straddles the Manitoba-Saskatchewan border. Operations have been conducted mainly on the Saskatchewan side of the border.

However, by 1960 a major production shift to the Manitoba side of the border is expected, and Saskatchewan production may be halved, because more new discoveries have been made in Manitoba than in Saskatchewan. The Manitoba discoveries include two deposits near Snow Lake (70 miles east of Flin Flon), and three deposits 15 miles east of Flin Flon.

The Flin Flon deposits consist of massive and disseminated pyrrhotite, pyrite, chalcopyrite, and sphalerite. The deposits occupy shear zones in the early Precambrian Amisk greenstones, in which they form lenticular replacement bodies.

Present daily production is on the order of 4,500 tons, the greater part of which comes from the Saskatchewan section of the Flin Flon mines and from the small deposits at the Birch Lake and Coronation mines. In addition to copper, the following metals are extracted from the ore--cadmium, gold, selenium and tellurium, silver, and zinc. According to information provided by the Mines Branch of the Saskatchewan Department of Mineral Resources, the total reserves of ore on the Saskatchewan side of this area amount to 14,142,000 tons. Table 47 shows actual production for 1957 and estimated production for 1958.

The role that Saskatchewan's copper resources will play in the expanding Canadian output will be governed by quality and accessibility of copper developments in the Precambrian area other than those at Flin Flon. A wide divergence of opinion exists regarding Saskatchewan's favorability compared with that of the Precambrian areas of Manitoba and Ontario. The mining people, at present, appear to favor exploration in Manitoba or Ontario, but they are quick to admit that this is a matter more of prejudice based on the incidence of recent discoveries than of sound reasoning. Discovery of another mine in Saskatchewan approaching the magnitude of Flin Flon would immediately reorient their opinions. As it appears that Saskatchewan production of copper from the Flin Flon area has a somewhat limited future, more attention should be focused on alternative sources of mineral wealth. Up to the present, no area in the province has shown more promise than that around La Ronge. Even in this region, which extends in an northeasterly direction from La Ronge to Reindeer Lake, and in the area around Rottenstone Lake, there is not sufficient evidence of commercial deposits to justify any great capital expenditure. An airborne magnetic survey undertaken in the Rottenstone area proved inconclusive. Nevertheless, mineral ores containing copper and other valuable metals appear to be present in commercial quantities. Should a mining industry prove feasible in the area, it might not be unreasonable to consider the installation of a custom smelter at La Ronge to produce blister copper for shipment to Ontario or Quebec for electrolytic refining.

Table 47

PRODUCTION FROM FLIN FLON SASKATCHEWAN MINES
1957-1958

Element	Unit	1957 (actual)		1958 (estimate)	
		Quantity	Dollar Value	Quantity	Dollar Value
Cadmium	lb	187,439	$ 255,617	308,060	$ 374,750
Copper	lb	61,193,681	14,028,561	74,000,885	18,017,293
Gold	oz	75,236	2,533,356	84,000	2,850,200
Selenium and Tellurium	lb	41,258	451,339	28,800	153,500
Silver	oz	1,145,571	1,000,804	1,264,000	1,087,000
Zinc	lb	90,140,339	8,881,160	99,000,000	8,200,000
Total			$27,150,837		$30,682,743

Source: Saskatchewan Department of Mineral Resources.

Unless a new refining process is developed, however, it is unlikely that copper bars or ingots will be produced in Saskatchewan. Thus, industries developed in the province which utilize copper cannot strictly be regarded as resource-based, as their raw materials will have to come from eastern refineries. It is likely, therefore, that copper will continue to be a raw material export from Saskatchewan, and industries in the province utilizing copper are most likely to be oriented to the Prairie market.

Copper production in Saskatchewan 1956-58 was as follows:[1/]

Year	Copper Production (pounds)	Value (dollars)
1956	66,237,560	$27,426,903
1957	61,193,681	17,715,571
1958	75,345,369	19,160,327

In order to assess Saskatchewan's prospects in copper, it is necessary to undertake a thorough examination of the world situation with regard to production and marketing of the metal.

Copper is a metal of many uses, particularly to the electrical industry which accounts for about half the consumption. The remainder is used mainly in the manufacture of brass, bronze, and other metals or alloys. Competition from substitute metals is severe, particularly from aluminum and certain plastics and this is yet another factor which must be considered carefully in examining the future of copper.

Approximate world copper reserves, by region, are given in Table 48. The estimate of 190 million short tons is intermediate between the recent high and low estimates of 240 and 140 million tons, respectively.

In considering these estimates, it should be realized that (1) physical measurement of existing reserves is virtually impossible, (2) company estimates of reserves are generally understated because taxes are

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1/ General Review of the Mining Industry, 1957 and Preliminary Report on Mineral Production, 1958, D.B.S.

Table 48

APPROXIMATE WORLD RESERVES OF COPPER, BY REGION
1957

Region	Metal Content (millions of short tons)	Percent of World Total
Canada	7	4%
United States	50	26
Mexico	4	2
West Coast of South America	70	37
Africa	40	21
Asia	2	1
U.S.S.R.	11	6
Australia	1	1
Western Europe	5	2
Total	190	100%

Source: Based on data received from copper companies.

paid on stated reserves, and (3) recoverable reserves depend on the price of copper.

As to the last point, it is probable that the reserves given in Table 48 are available at the average postwar price of copper; additional reserves are undoubtedly available at a price significantly higher than this average.

Free World copper consumption has increased from a level varying between 1 million and 2 million tons during the 1930's to 2 million to 3 million tons during the first postwar decade. In 1955 and 1956, consumption reached an all-time high of 3.5 million tons.

Growth in different areas of the world has varied considerably. Consumption in the United States since World War II has remained stationary at 1.3 million to 1.5 million tons, except for depressed conditions in 1949 and 1954. During this dynamic postwar period, when the gross national product increased 40 percent, copper consumption failed to increase. In Europe, on the other hand, copper consumption increased 50 percent from the prewar and early postwar level and is now at about 1.5 million tons, which is comparable with United States consumption.

Consumption in all other areas is small by comparison. Asia uses 200,000 tons, still below its prewar peak, and Canada uses 150,000 tons. All other areas use copper at 20,000 to 40,000 tons per year.

Long-range projections of demand are more difficult for copper than for steel, because of possible reserves limitations, potential price as compared with competing materials, and loss of markets to competing materials. It seems certain, however, that world demand for copper will increase gradually. United States experience since the war and potential reserves limitations are two indications that consumption of copper may grow much more slowly than world economic output or industrial production. Thus, while industrial production is expected at least to triple between 1955 and 2000, copper consumption during this period may grow by only about 50 percent, to 5 or 6 million tons. Using 5.5 million tons as an intermediate estimate, regional distribution by 2000 may be approximately as follows:

Region	Copper Consumption (millions of short tons)
Canada	0.2
United States	2.0
Europe	2.0
All Other Free World	1.3
Total Free World	5.5

Consumption for 1975 is estimated at 4.5 million tons.

Canadian production of copper, which in recent years has averaged approximately 0.3 million tons annually, is expected to expand by more than 50 percent in the next 25 to 30 years. This projection is based on stated reserves, favorable possibilities for new discoveries in the Precambrian shield, and the favorable location of Canada to supply the deficit United States market.

United States copper mines are relatively high-cost producers, but appreciable new capacity has been added in the past five years. Long-range output of 1 to 1.5 million tons is expected. Africa, although its reserves are less than those of the West Coast of South America, has pulled ahead of the latter in annual production and now produces about 800,000 tons per year. Africa is in a favored position because it has high-grade, low-production-cost ore. Moreover, the reserves in Africa are undoubtedly understated. The West Coast of South America has remained at a production level of about 700,000 tons or less for the past 15 years. Production in all other regions of the world has been relatively small.

On the basis of stated reserves and the possibility of new discoveries, expected production by region may be approximately as follows in 2000:

Region	Copper Production (millions of short tons)
Canada	0.5
United States	1.5
Africa	1.5
West Coast of South America	1.5
All Other Free World	0.5
Total Free World	5.5

Zinc

Zinc, found in association with copper in the Flin Flon mines, is second to copper in importance among base metals currently mined in Saskatchewan. The Flin Flon mines yield high-grade zinc, most of which is used in die-casting and alloy-making, with very little used in galvanizing. As with copper, however, the future of Saskatchewan's zinc in the Flin Flon area seems to be limited, and the major potential for zinc production now appears to lie in the La Ronge area.

Zinc production in Saskatchewan for 1956 through 1958 was as follows:[1/]

Year	Zinc Production (tons)	Value (dollars)
1956	45,375	$13,468,767
1957	45,070	10,897,967
1958	48,856	10,611,504

1/ General Review of the Mining Industry, 1957 and Preliminary Report on Mineral Production, 1958, D.B.S.

The principal use of zinc is in galvanizing, which accounts for approximately 40 percent of the total slab zinc consumed. Die-casting is the second largest use and it is expected that the demand for zinc in this use will continue to expand. Competition from aluminum and other substitute products has sharpened in recent years, but zinc has inherent mechanical, physical, and chemical advantages that make it preferable to aluminum. Also, zinc sells at about two-thirds the price of aluminum.

Large quantities of slab zinc are used in brass-making, especially in wartime. Since 1946, zinc consumed for brass has averaged less than 15 percent of the total slab zinc used. Zinc is also used in sheet and rolled forms and in pigments and chemicals.

Reserves of zinc ore are widely distributed; besides Canada, important deposits are to be found in the United States, Mexico, Argentina, Bolivia, Peru, Chile, and Greenland in the Western Hemisphere and in many countries of Europe, Africa, and Asia, as well as in Australia. Zinc reserves in the measured and indicated classifications are estimated to total over 70 million short tons of metal. Of this amount, about 35 percent occurs in North America, 8 percent in South America, 30 percent in Europe, 15 percent in Australia, about 8 percent in Africa and Asia, and 4 percent in other areas. Available information suggests that total zinc reserves (in measured, indicated, and inferred ore) approximate 200 to 300 million tons.

In recent years about one-half to two-thirds of the total zinc that moved in international commerce was in concentrates. It appears probable, however, that in a few years zinc smelting capacity in producer countries will be greatly increased and trade in zinc concentrates will be drastically reduced.

The United States is the world's largest importer of zinc concentrates, drawing from every continent but Asia--with Mexico and Canada the major suppliers. European importers receive zinc concentrates from Canada, South America, Australia, Africa, Spain, and Italy. In metallic zinc, Canada is the principal exporter; its exports go primarily to the United States and the United Kingdom. The major United States imports come from Canada.

The production of zinc ore has experienced a gradual upward trend since 1930. Production in Africa, South America, Canada, and Mexico has been increasing rapidly, offsetting downward trends in Europe, Australia, and the United States during the same period.

The world's production of zinc is difficult to project, as is the future production of lead and copper, because there is likely to be continuing replacement of traditional markets by other metals. Despite this replacement, however, a modest growth in the total use of zinc is probable because of the tremendous expansion destined to take place in the world economy. World production of zinc is estimated to increase from 2.8 million tons in 1956 to 3.5 million tons in 1975 and 4.0 million tons in 2000. Allocating this production to regions on the basis of reserves, United States production is expected to drop 20 percent, to 0.4 million tons in 2000. Modest increases in production in Canada and Mexico are expected, and production on the West Coast of South America is expected to increase from 0.18 million tons in 1956 to 0.35 million tons in 2000. Australian production is also expected to double. Increases in production of 50 to 75 percent are expected in Europe, Asia, and Africa.

The moderate increases in zinc consumption expected in North America and Europe, coupled with the projected decline in United States production and Canada's proximity to the United States, indicate that the long-run outlook for expansion of Canadian zinc is favorable. As with copper and lead, the potential role of Saskatchewan zinc will be governed by developments in other parts of the Precambrian shield.

Industries in Saskatchewan based on zinc resources are likely to be restricted to mining and production of concentrates. A refinery in the province is an unlikely prospect; thus any concentrates produced would move either to the United States or to the Flin Flon refinery.

Cadmium, Selenium, Tellurium, and Platinum[1/]

Cadmium, selenium, tellurium, and platinum are called high-temperature metals and they occur in association with other metals such as copper, zinc, and gold. Generally speaking, they are regarded as by-products in the extraction of the major base metals. Their principal use is in the form of metal compounds or alloys in electrical fittings, in high-speed storage batteries, as a catalyst in oil refining, and as pigments. The market outlook for these metals is excellent and their presence in ores provides an added incentive to mining operations directed primarily to the extraction of such metals as copper and zinc.

1/ There are known occurrences of platinum, but at the present none is utilized.

Production of these metals, however, is subject to wide fluctuation, as can be seen from the following table of production in Saskatchewan, 1956-58.[1/]

	1956		1957		1958	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Cadmium	116,906	$198,832	187,439	$318,646	305,322	$464,089
Selenium and Tellurium	63,000	835,000	41,000	443,000	125,350	853,000

Gold and Silver

Gold and silver production in Saskatchewan is similar to that of the high-temperature metals. The presence of these precious metals in copper- or zinc-bearing ores makes the development of the latter metals all the more attractive to the producer. However, as this situation exists throughout most of the Precambrian shield, the development of Saskatchewan's metal resources depends primarily on other factors, such as extent of ore body and accessibility.

A number of promising indications of gold exist in the La Ronge and Rottenstone areas and, given greater accessibility and an increase in gold prices, a substantial increase in production might take place and make Saskatchewan a gold producer of greater importance.

Production figures in Saskatchewan for the years 1956 through 1958 are as follows:[1/]

	1956		1957		1958	
	Ounces	Dollars	Ounces	Dollars	Ounces	Dollars
Gold	82,687	$2,848,567	75,236	$2,524,168	89,179	$3,030,302
Silver	1,179,110	1,057,426	1,145,571	1,000,885	1,323,813	1,149,996

1/ General Review of the Mining Industry, 1957 and Preliminary Report on Mineral Production, 1958, D.B.S.

Lead

Lead is not produced in Saskatchewan at the present time. However, the province does have distinct potential for its production. The development of Saskatchewan's lead resources is related to lead production in the whole Precambrian complex. If ore comparable to that discovered around the Great Slave Lake in the Northwest Territories is proved in Saskatchewan, transportation would favor development of the Saskatchewan reserves. The ultimate mining of lead in Saskatchewan would also be dependent on the feasibility of extracting other metals, such as zinc or silver, found in association with it. Barvue Mines Limited in Quebec found that a low-grade lead concentrate could be economically recovered when the lead content of zinc concentrate approached 2 percent.

The principal uses of lead are for storage batteries, tetraethyl lead, cable covering, paint pigment, building construction, ammunition, and various alloys. An important application of lead is nuclear shielding against certain types of dangerous radiation.

The greater part of lead used is ultimately reused as secondary metal, but that used in pigments and chemicals is not recoverable.

Total developed world reserves of lead ore are estimated to contain approximately 40.5 million tons of the metal. In all probability, the lead content of inferred ore is somewhat larger. Of the total tonnage of developed reserves, 10 million tons are in North America, 2.5 million in South America, 10 million in Europe, 3.5 million in Africa, 2 million in Asia, and 12.5 million in Australia. The largest and most important reserves are in Canada, Australia, the United States, Mexico, Peru, Argentina, Bolivia, Germany, Spain, Italy, Sweden, Russia, Yugoslavia, French Morocco, Algeria, and Burma.

Canada ranks fifth among the world's primary producers of lead, after the United States, Australia, Mexico, and West Germany. More than two-thirds of Canada's total production is exported, with 50 to 60 percent of exports going to Europe, 30 to 40 percent to the United States, and about 10 percent to Japan.

Since 1950, prospecting, exploration, and preliminary development in Canada have indicated approximately 100 million tons of lead-bearing ores in the Northwest Territories and in New Brunswick.

The recovery of lead from scrap material constitutes an integral and important part of the United States lead industry. Total secondary

lead smelter capacity approximates 550,000 tons annually. Nearly 60 percent of the lead-mine production of the United States comes from the western part of the United States, the remainder from the west-central and eastern states.

Lead production in the Western World has remained almost constant since 1930. During this same period, production in the United States and Mexico has remained very steady, Canadian production has dropped, and South American and African production has been increasing rapidly.

The market outlook for lead is not promising; even though consumption has risen steadily since the war, present consumption is only at a level comparable with that of 1929. Nevertheless, some further increase is expected, perhaps to 2.2 million tons in 1975 and 2.6 million tons in 2000, as compared with 1.8 million tons in 1954. It is expected that United States production will decline, and, with a gradual increase in the consumption of lead in both Canada and the United States, as well as in Europe and the Far East, Canadian lead producers can expect a reasonable expansion in markets. However, they are likely to encounter increasing competition in their major export markets from Australia and the West Coast of South America.

Probably the only industries in Saskatchewan based on lead resources would be mining and production of concentrates for shipment either to the United States or to the smelter at Trail, British Columbia.

Nickel

Canada accounts for about 80 percent of world nickel production, exclusive of Iron Curtain countries. Approximately 75 percent of Canada's output is exported to the United States, and another 12 percent is exported mainly to Europe.

The major use of nickel is in the production of stainless steel, alloy steels, and jet-engine alloys. Another important use is in nonferrous castings alloyed with metals such as copper, aluminum, and chromium. The third largest use is in plating.

The only significant Free World reserves of nickel appear to be in the Precambrian shield. Thus, Canada is in a unique position as a supplier. The largest and only significant consumer of nickel is the United States. Future consumption in the United States is governed by (1) the development of possible competing materials, (2) continued defense spending, (3) expansion of nickel alloys, and (4) other uses in commercial and military products.

As with other base metals, the demand for nickel is difficult to project because of possible replacement of existing markets, principally alloys, by other metals. However, nickel has withstood competition from other metals better than have lead, copper, or zinc; thus continued expansion is likely.

The possible development of Saskatchewan's nickel is influenced by recent expansions in Canada's nickel-producing capacity at Lynn Lake and Moak Lake in Manitoba, and Rankin Inlet in the Northwest Territories. Such developments make the utilization of Saskatchewan reserves unlikely in the near future. Industries based on ultimate development of the province's nickel resources will probably be limited to mining and concentration of ore.

Iron

The steel mill currently under construction near Regina, recent developments in steel fabricating in the province, the detailed exploration of the Choiceland iron ore deposit which is presently under way (see Figure 31), and the recent discovery of iron mineralization near La Ronge all indicate that a rather thorough analysis of the iron and steel industry is warranted. The objective of this discussion is to appraise the future prospects for steel industry and iron ore developments in Saskatchewan.

At present, exploration for iron ore is under way near Choiceland. This area, shown in Figure 31, is south of the line separating the surface Precambrian from the sediments. However, the iron formation is in the Precambrian under 2,000 feet of sedimentary rocks. Reports from Kelsey Lake Development Company, which is conducting the Choiceland exploration, indicate that a very large deposit containing 35 percent iron has been found. Whether or not this grade of ore can be mined economically from depths of more than 2,000 feet in Saskatchewan is a problem for careful investigation before the large capital investment necessary for the development of a mine would be justified. However, there seems to be a large potential for future iron production.

Iron (see Figure 31) has also been found in a widespread area centering 150 miles northwest of La Ronge. Additional airborne magnetometer surveys and surface investigation are required to evaluate the iron potential of the area.

The following analysis deals with the supply and demand factors likely to affect the market for potential Saskatchewan production of steel ingots, pig iron, iron ore, and fabricated steel items.

Steel-Ingot Production

The early history of steel production in the regions of the world that are now major producing regions demonstrates the rapid rise of production and subsequent leveling off of the rate of growth as the economy has matured. At the present time, the Near and Middle East, Latin America, and Africa are in a stage of rapid growth. Within the next 20 years, it is probable that all these regions will have completed the extremely rapid growth phase of steel output, with increases over present production of 300 to 500 percent by the year 2000. Subsequently, other regions may well experience similar rates of growth. The United States, on the other hand, is expected to experience the slowest rate of growth--an increase of 182 percent by 2000. Table 49 summarizes the estimated steel production for 1960, 1975, and 2000 as compared with actual production in 1955. World production is estimated to increase from the present level of about 300 to 350 million tons annually to 1 billion tons in 2000, or an estimated increase of 260 percent, according to this analysis. A 350 percent increase in world production was sustained between 1910 and 1955.

These projections, based upon correlations of steel demand with population, gross national product, and industrial production, estimate increases at a rate varying between 3 and 4 percent per year. Steel demand is expected to increase at about the same rate: steel is one of the basic commodities and is related to virtually all aspects of economic activity. In some uses, steel is being displaced by other materials; but so far, other uses have emerged to counterbalance the losses in markets.

For underdeveloped areas, it is assumed that national production will increase 4 to 5 percent per year, with industrial output increasing at a somewhat faster rate. Steel production, however, is expected to grow even more rapidly in some areas, particularly in the next 20 years, because (1) a large percentage of steel demand in each area will be met locally, and (2) since steel is one of the first segments of industry to be developed, its growth rate during the early years of the industrial development of an area is much more rapid than over-all industrial development.

It is expected that the United States, Western Europe, and Eastern Europe will have approximately the same level of steel production--about 300 million tons annually by the year 2000. South Asia and the Far East should be next in importance, producing at least 80 million tons by the year 2000, or 25 to 30 percent of the production in the three major regions. All the other regions fall well below this, with a production by 2000 in the range of 6 to 18 million tons annually.

Table 49

ESTIMATED WORLD PRODUCTION OF STEEL INGOTS, BY REGION
1955-2000

Region	Millions of Net Tons				Percentage Increase 1955-2000
	1955	1960	1975	2000	
Canada	4.5	5.4	9	18	300%
United States	117.0	130.0	190	330	182
Latin America	2.8	4.0	8	16	540
Western Europe	87.8	115.0	180	300	244
Eastern Europe	65.3	85.0	157	300	356
South Asia and Far East	15.9	21.0	39	80	402
Near and Middle East	0.2	0.6	2	6	2,900
Africa	1.8	2.0	4	10	455
Australasia	2.5	3.0	6	12	380
Total World	297.8	366.0	595	1,072	260%

Sources: 1955 - International Iron and Steel, U.S. Dept. of Commerce, March 1957.
1960-2000 - Estimated by Stanford Research Institute.

So far as is known, there are no firm plans for additional steel capacity much beyond 1960, but present world expansion is indeed significant. World capacity in 1960 is estimated to be 423 million tons as compared with 345 million tons in 1957. Between 1957 and 1960, in other words, there will be an expansion of 23 percent.

Potential growth of steel-ingot consumption in the western United States and western Canada is of major importance to Saskatchewan. Projections of consumption based on SRI forecasts of population and income are as follows: 9 million tons in 1960, 15 million tons in 1975, and 30 million tons in 2000. The projections are based upon past trends in the growth of manufacturing; changes in the present pattern of manufacturing activity are not assumed.

Pig-Iron Production

Direct data on historical consumption of iron ore do not appear to be available by regions of the world, but consumption of iron ore is related directly to the production of pig iron and ferroalloys. Data on the production of pig iron and ferroalloys are shown in Table 50. The relationship between pig-iron production and steel-ingot production is dependent on the ratio of pig iron to steel scrap, which in turn is dependent upon the availability and price of steel scrap, blast furnace capacity, and other factors. The United States has the highest dependence upon steel scrap, followed closely by Canada and Europe. In most other areas the short supply of steel scrap limits the potential use of this material.

From recent reports on iron and steel scrap it appears that Canada, the United States, Europe, and Japan may somewhat reduce their relative dependence on scrap.

Iron-Ore Consumption

Based on the estimates of pig-iron production given above and the average iron content in the iron-ore sources for each region, estimates of the consumption of iron ore by each region, for the period 1955 to 2000, were prepared and are presented in Table 51. Consumption of iron ore in the United States and Canada combined, Western Europe, and Eastern Europe is expected to be about 375 million tons each by 2000. Total world consumption is expected to be approximately 1.3 billion tons.

Table 50

ESTIMATED WORLD PRODUCTION OF PIG IRON AND FERROALLOYS, BY REGION
1930-2000
(Millions of Metric Tons)

Region	1930	1940	1950	1955	1960	1975	2000
Canada	--	1.3	2.3	2.9	3.5	6	12
United States	32.3	43.1	60.0	68.9	76.8	112	195
Latin America	--	0.3	1.1	1.7	2.7	6	11
Western Europe	36.6	32.3	38.6	57.2	73.0	115	192
Eastern Europe	7.3	18.2	24.7	41.7	53.7	99	189
Africa	--	--	--	1.3	1.5	3	8
Middle East	--	--	--	0.2	0.6	2	6
Far East and South Asia	2.1	6.5	6.2	10.8	14.7	27	56
Australasia	--	1.3	1.1	1.9	2.4	5	9
Total World	78.3	103.0	134.0	186.6	228.7	375	678

Sources: Actual - Annual Statistical Report, American Iron and Steel Institute.
Estimated - Stanford Research Institute.

Table 51

APPROXIMATE WORLD CONSUMPTION
OF IRON ORE, BY REGION
1955-2000
(Millions of Metric Tons)

Region	1955	1960	1975	2000
Canada	5	7	11	22
United States	123	137	200	350
Latin America	3	5	10	20
Western Europe	126	160	240	380
Eastern Europe	85	107	198	370
Africa	3	3	6	15
Middle East	1	2	4	12
Far East and South Asia	23	29	55	113
Pacific	4	5	9	18
Total World	373	455	733	1,300

Sources: 1955 - Derived from pig-iron production and the average ratio of iron ore to pig iron adjusted for average iron content of ore utilized in each region.

1960-2000 - Estimated by Stanford Research Institute.

Iron-Ore Production

In most regions of the world, iron-ore exploration to date has been inadequate; estimates of ultimate reserves therefore cannot be made. In many cases, even the reserves of presently known deposits cannot be stated with precision, owing to inadequate evaluation. Moreover, it is difficult to estimate over a long period whether countries such as the United States and Canada will rely on high-grade imported ore or turn to their own vast deposits of low-grade ore. Production from this low-grade ore would require expensive processing and high transportation costs because of long overland shipping routes. Based on presently known plans, it appears that the production of iron ore in the United States will remain relatively constant at 100 to 150 million tons per year. However, recent developments at Knob Lake indicate the trends toward expansion of Canadian production. Table 52 summarizes the iron-ore reserves and production trends in Canada and the United States and gives estimates of production from 1960 to 2000.

Estimated Canadian production of 120 million tons by 2000 appears high in relation to its known reserves, but there is considerable incentive to find new reserves (such as the Choiceland ore deposit) because of Canada's strategic location in relation to the United States and European markets. Also there appears to be considerable opportunity to find new reserves.

Iron-Ore Supply-Demand Balance, by Region

In order to show Canada's position as an iron consumer and exporter in competition with other iron-producing areas, the expected production, imports, exports, and consumption of iron ore for each major region of the world are presented in Table 53.

Although stated reserves in Eastern Europe would not support the estimated production magnitudes shown in Table 52, it is understood that potential reserves are vast; production is therefore assumed to be sufficient to meet consumption requirements.

Sources of ore for the United States are Canada and Latin America, which are expected to split the required imports equally in 1975; by the year 2000, however, Latin America is expected to be furnishing 65 percent of the required imports to the United States. Since Latin America has relatively greater ore reserves than has Canada, it is reasonable to expect that Latin America will eventually become the predominant source of iron ore for the United States.

Table 52

IRON-ORE RESERVES AND ESTIMATED PRODUCTION OF IRON ORE
IN CANADA AND THE UNITED STATES
1940-2000
(Tons in Millions)

Country	Reserves			Production					
	Total Ore	Iron Content	Percent Iron	1940	1950	1955	1960	1975	2000
Canada	3,400	1,700	50%	2	3	15	29	70	120
United States	6,900	3,400	49	74	100	103	100	110	150
Total World	84,580	41,700	49	195	239	373	455	733	1,300

Sources: Survey of World Iron Ore Production, United Nations, 1955. Annual Statistical Report, American Iron and Steel Institute. Projections by Stanford Research Institute.

Table 53

ESTIMATED REGIONAL SUPPLY-DEMAND BALANCE FOR IRON ORE
1975-2000
(Millions of Metric Tons)

Region	1975				2000			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Canada	70	0	59	11	120	0	98	22
United States	110	90	0	200	150	200	0	350
Latin America	87	0	77	10	267	0	247	20
Western Europe	150	90	0	240	150	230	0	380
Eastern Europe	198	0	0	198	370	0	0	370
Africa	50	0	44	6	100	0	85	15
Middle East	4	0	0	4	12	0	0	12
Far East and South Asia	55	0	0	55	113	0	0	113
Pacific	9	0	0	9	18	0	0	18
Total World	733	180	180	733	1,300	430	430	1,300

Imports to United States		
Country	1975	2000
Canada	45	73
Latin America	45	127
Total	90	200

Imports to Western Europe		
Country	1975	2000
Canada	14	25
Latin America	32	120
Africa	44	85
Total	90	230

Imports of iron ore to Western Europe are expected to come from Latin America, Africa, and Canada. In 1975, Africa is expected to serve half of Western Europe's needs for imported iron ore; but by the year 2000, Latin America, with its larger reserves, may well be the largest source for Western Europe.

The foregoing analysis indicates the potential role of Canada as a producer, consumer, and exporter of iron and iron ore. The operation of importance to Saskatchewan is the potential role that iron resources of the province might play in the Canadian picture. The large reserves of ore in Quebec and the Great Lakes region make it unlikely that Saskatchewan ore would move into eastern Canada or midwestern and eastern United States. Thus, the most likely markets lie in the western regions of North America, particularly British Columbia, Washington, Oregon, and California (the West Coast). The local supply situation for this market is discussed below.

Sources of Iron Ore for the Western Region of North America

The 11 Western States[1/] are currently self-sufficient in iron ore, and, in fact, export a small tonnage to Japan. However, the extent to which the area can increase its iron-ore output appears to be rather limited. Latest data released by the United States Department of the Interior[2/] show that the West (United States) has about 500 million tons of reserves and about 200 million tons of potential ore. This amounts to 8.7 percent of the presently estimated United States reserves and 0.8 percent of the potential ore. Some of the recent developments in Montana and Nevada will probably raise these estimates; yet current thinking of the western steel industry is that western ore production will be limited to a level of about 10 million tons, compared with a 7 to 8 million ton average for the past five years. Potential production is limited not only by the magnitude of reserves but by the distribution of the reserves over many small deposits and by the relatively inaccessible locations of some of the deposits, particularly mills located on the West Coast of North America.

Other possible sources of supply on the West Coast of North America are British Columbia, Alaska, and Mexico. British Columbia is

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1/ California, Arizona, New Mexico, Utah, Colorado, Montana, Wyoming, Idaho, Washington, Oregon, and Nevada.

2/ United States Department of the Interior Information Service, "Geological Survey Estimates, United States Iron Ore Resources," July 15, 1957.

presently producing a small quantity of iron ore; but, the potential is limited, not only because the deposits are small but because the geology of the area is not favorable to additional ore discoveries of appreciable magnitude. Alaska may have major ore deposits but none are now known, and the same is true of western Mexico. Estimated production in these three areas available to the western steel industry is estimated at 2 million tons in 1975 and 5 million tons in 2000.

Subtracting the total potential western North American supply of iron ore from the western market leaves a deficit of 6 million tons in 1975 and 20 million tons in 2000. Saskatchewan is obviously in a favorable position to compete with South American sources and possibly with eastern Canadian sources in supplying this deficit market.

It is considered extremely unlikely that a steel industry in Saskatchewan would be predicated on ore from outside the province. Thus, significant expansion of the steel mill currently under construction is most likely to develop from addition of blast furnace facilities, which would utilize Saskatchewan ore for production of steel ingots and pig iron. These products would be used in the existing mill and in the western market area of Canada and the United States.

In the event that rail transportation to North American West Coast points could not compete with ocean transport from South America, a plant utilizing the Udy process (which allows small-scale smelting operations to be relatively economic) might be considered to supply the Prairie market.

Iron and Steel Manufacture

The existing pipe mill in Regina has already placed Saskatchewan in a significant position in the manufacture of iron and steel. The completion of Interprovincial's steel mill and the steel fabricating plant planned by the Dominion Bridge Company will lead to Regina's becoming an important Prairie steel center. Although the steel mill is to be predicated initially on scrap, which is not strictly a natural resource, the mill can justifiably be regarded as a resource-based industry. The market for iron and steel products in Saskatchewan will be primarily in the Prairie region and to a limited extent in British Columbia. The economy of western Canada is growing very rapidly. Population is expected to triple by the year 2000 and income should quadruple. With this favorable economic outlook, the consumption of steel should at least quadruple. Apart from competition from mills and associated fabricating already existing in each of the other three western provinces, it is

likely that ocean shipments into British Columbia from eastern Canada and Europe will continue to increase. Much of the iron and steel products brought in to the West Coast of North America from Europe is in material such as wire products, which have a relatively high labor content. Western Canadian mills cannot compete on these products. As long as the wage disparity between Canada and Europe continues, it is expected that the shipments from Europe will increase, along with the natural increase in the market for these products.

Saskatchewan already has an appreciable steel fabricating industry based on steel imported from eastern Canada and oriented mainly to the provincial market. In 1956 the D.B.S. listed six establishments in the province using sheet metal (mainly steel) and other forms of iron and steel as the basis for production. These establishments employed 267 people, with a net value added by manufacture of $1.15 million. Since 1956, the most notable additions to this industry have been the Prairie Pipe Manufacturing Company and the Western Wire and Cable Company. The above figures indicate that even without a steel mill Saskatchewan has a potential for expanded steel fabricating activity which is market-oriented. However, the presence of a steel mill will be an added incentive to expansion of steel fabricating, both in existing industries and new industries, such as mining and milling equipment, tanks, petroleum refining equipment, agricultural machinery, pipe and fittings, truck and trailer bodies, building and bridge frames, and loading and transportation equipment.

The ultimate development of the steel fabricating industry in Saskatchewan is closely related to its position in the primary market--the Prairie Provinces. The potential size of this market is discussed in Section IV. It is expected that the size of the market for steel products should be proportional to increases in total income of the area.

Saskatchewan's position in the center of this market, however, is not as favorable as might appear from a perusal of the map. The population of the Prairie region is expected to continue to be concentrated in the urban areas of Alberta and Manitoba. Thus, until Saskatchewan produces steel from ore, fabricators in the province can only expect to compete in the other Prairie Provinces in specialty products, as both Edmonton and Winnipeg have existing steel mill capacity. However, with expansion of Saskatchewan mill facilities to handle ore reduction and produce a wider range of output, Saskatchewan manufacturers will be able to compete with producers in the other Prairie Provinces in those items in which Saskatchewan steel is used, provided that favorable freight rates are available. It should be recognized that a Saskatchewan steel plant could never expect to supply all the varieties of steel required

for the various fabricating enterprises which could be carried on in the province.

In summary, the growth of the steel fabrication industry in Saskatchewan is directly related to several fundamental factors:

1. The volume and price of specific types of finished steel provided by a local source of supply, compared with the price and range of types available from eastern Canada.

2. The increase in demand for steel in the Prairie Provinces and particularly in Saskatchewan for uses such as utilities, construction, mining and milling operations, and the oil industry.

3. High freight rates on fabricated products from the east which will reduce competition from eastern products.

4. The development of the inventive abilities of resident enterprisers who, having established themselves in Saskatchewan, will elect to remain to manufacture their exclusive and patented machinery and equipment (e.g., Richardson Road Machinery Co. Ltd.), and serve from this area a world-wide market.

Limiting the future growth will be:

1. The restricted market as influenced by freight rates and a relatively sparse though increasing population in the Prairie Provinces.

2. The freight rates on specific types of steel, not available locally, which must be transported from eastern Canada and the United States.

Other locational factors, such as supplies of fuel, power, and labor are generally favorable.

Specific industrial opportunities exist in iron and steel manufacturing such as galvanizing, metal furniture, and other sheet-metal products. The Industrial Development Office has carried out opportunity studies for manufacture of welded and heavy-riveted pipe and sheet-metal products (Appendix A, Table 91).

Summary of Prospects for Metallic Minerals in Saskatchewan

Saskatchewan is an important producer of uranium, copper, and zinc and there are good indications that additional reserves of these and other metals will be found. The province, however, is in an isolated position with regard to markets, faces a plentiful world supply of these metals at least in the short run, and must compete with ore deposits in other areas of North America closer to industrial centers.

Saskatchewan's position is such that the next few years probably will witness a fall in production of all three major metals. Uranium is likely to remain about constant in physical production but will probably fall in value, and copper and zinc are likely to be cut back as more favorable ores in Manitoba are mined. In the long run, however, it is expected that production will recover and that new deposits will be discovered and developed in the province.

In addition, Saskatchewan has promising deposits of gold which may lead to the province's becoming an important producer.

Saskatchewan has a large variety of metallic ores but a great deal more research is required before a proper evaluation of resources can be made with conviction.

The following general conclusions regarding the Precambrian mineral potential can be drawn from available information.

1. The area has not been mapped or examined in sufficient detail to reveal its real potential.

2. The government's program for geological mapping is sound in choice of area and method of procedure.

3. The mapping program should be accelerated.

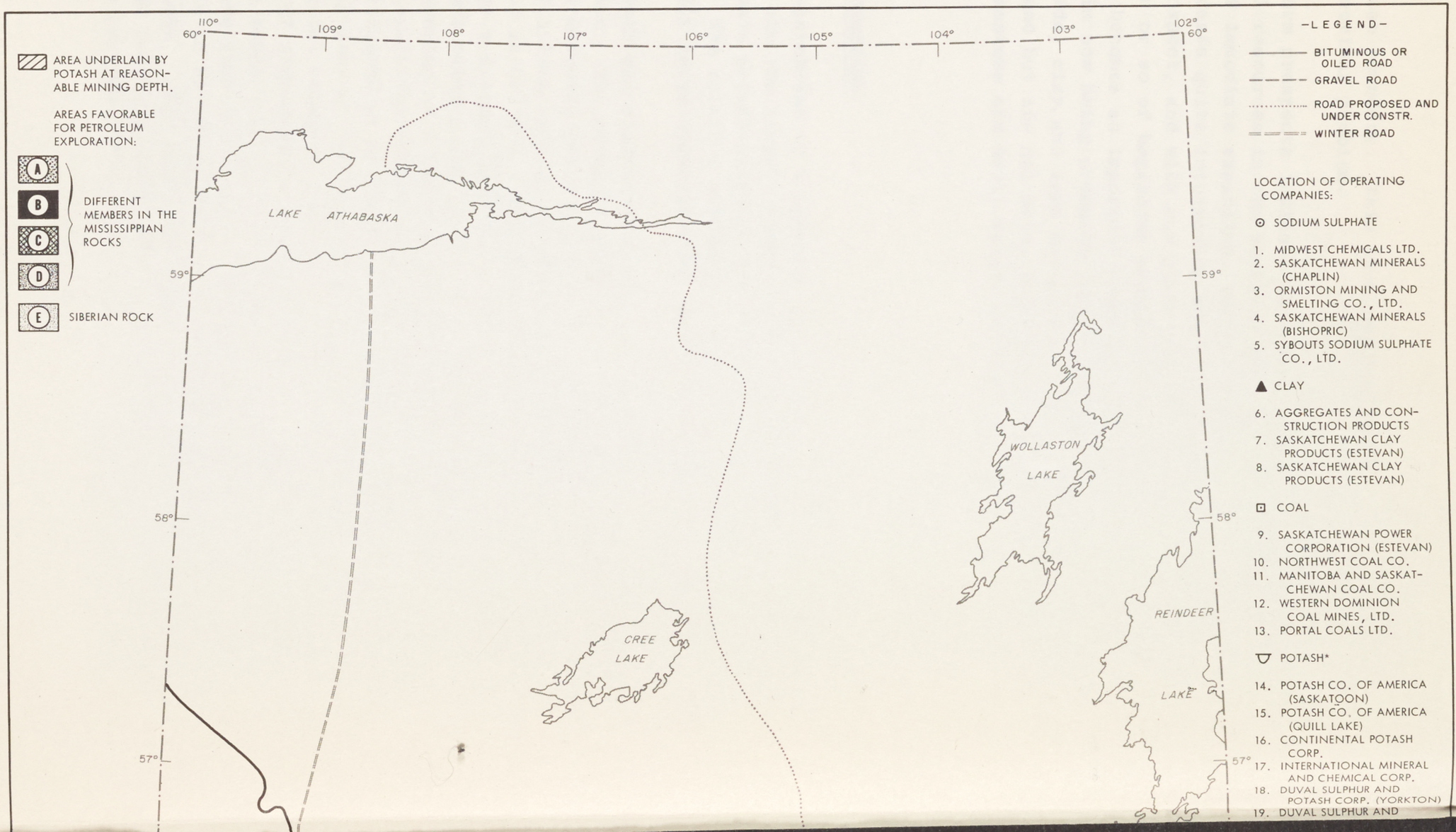
4. The areas marked on Figure 28 are most favorable for prospecting and are listed in decreasing order of favorability.

Industrial Minerals

The southern half of Saskatchewan is underlain by sedimentary rocks (see Figure 32). The rock formation dips gently to the south at a rate of 20 to 30 feet per mile, so that the thickness ranges from zero at the north along the Precambrian to more than 10,000 feet along the United

FIG. 32

SEDIMENTARY MINERAL RESOURCES OF SASKATCHEWAN



PRECAMBRIAN ROCKS

SEDIMENTARY ROCKS

20. U.S. BORAX AND CHEMICAL CORP.

△ CLAY DEPOSITS NOT LISTED ABOVE

XXX SILICA SAND DEPOSITS

*Only the Potash Company of America is in operation. International Mineral and Chemical Corp. and Continental Potash Corp. are developing deposits. The remainder are in the exploration stages.

CHURCHILL LAKE
PETER POND LAKE
CHURCHILL RIVER
LAC LA RONGE
WAPAWEKKA LAKE
PRIMROSE LAKE
DORÉ LAKE
SMOOTHSTONE LAKE
MONTREAL LAKE
CUMBERLAND LAKE
LLOYDMINSTER
STURGEON LAKE
PRINCE ALBERT
NORTH BATTLEFORD
REDBERRY LAKE
NORTH SASKATCHEWAN RIVER
BASIN LAKE
UNITY
AROMA LAKE
MUSKIKI LAKE
BRUNO
SASKATOON
QUILL LAKES
LITTE MANITOU LAKE
COLEVILLE
SMILEY
SOUTH SASKATCHEWAN RIVER
LAST MOUNTAIN LAKE
YORKTON
QU'APPELLE
ESTERHAZY
REGINA
CHAPLIN
MOOSE JAW
SWIFT CURRENT
WAPELLA
HATTON
OLD WIVES LAKE
CLAYBANK
BISHOPRIC
ORMISTON
CYPRESS HILLS
SHAUNAVON
EASTEND
WEYBURN
ST. VICTOR
WILLOW BUNCH
WOOD MOUNTAIN
ROCKGLEN
BIG MUDDY VALLEY
MINTON
OXBOW
ESTEVAN
RED DEER R.

A B C D E

110° 109° 108° 107° 106° 105° 104° 103° 102°
56° 55° 54° 53° 52° 51° 49°

States-Canadian boundary. This is a populated area and accessibility presents no serious problem.

Short-term prospects indicate the more rapid development of industrial mineral resources in the southern part of the province. Potash is assured of immediate expansion, whereas other materials have lesser but in some cases quite interesting potentialities. Potash has the brightest prospect, and with one plant already in production and another within a year or so of beginning production it should not be long before Saskatchewan becomes an important producer of potash. The other industrial minerals now being produced in the province are sodium sulphate, sodium chloride, clay, and sand and gravel. Other industrial minerals which are found but are not being produced at present are bentonite, pumicite, limestone and marl, silica sand, and magnesium.

Potash

Production

Saskatchewan is a newcomer to the field of potash production. The deposits are the largest known reserve of high-grade potash in the world. The main potash minerals are sylvite (KCl) and carnallite (KCl, MgCl, $6H_2O$). The relative abundance of sylvite (63 percent K_2O) results in phenomenally large tonnages that contain upwards of 25 percent K_2).

Potash was discovered almost by accident in holes drilled for oil exploration. The minerals occur in the Prairie Evaporite formation of the Middle Devonian which underlies 76,000 square miles of Saskatchewan south of a line cutting the Manitoba border at 51°30'N and the Alberta border at 53°45'N. Southward the area extends to the 49th parallel except for a triangular area in the south-central portion. The formation does not outcrop and indeed the northern boundary is formed by sedimentary overlap at a depth of not less than 2,000 feet. Recoverable reserves at localities within the areas indicated as favorable in Figure 32 are estimated at at least 4 billion tons K_2O content. These are only those portions of the deposit having characteristics most favorable for mining--total reserves are much greater. It has been estimated that the quantity of high-quality potash reserves in Saskatchewan is so great that it could supply the current demand of the entire North American continent for more than 2,000 years. Commercial production of potash in the province began in November 1958 at the Potash Company of America's plant at Patience Lake. The potash is mined from a shaft which was sunk to a depth of 3,450 feet. At full capacity, production will be at the rate of 4,000 tons per day, from which 1,600 tons of potash will be obtained.

Its high grade is expected to more than compensate for the problems inherent in mining at greater depth, so that resulting production cost will be lower than that at Carlsbad, New Mexico.

A second mine of the same magnitude is now being developed by International Minerals and Chemical Corporation near Esterhazy (Figure 32). It is scheduled to start producing in 1960. In 1958, at least 14 producing mine companies[1/] (sites of exploration of those underlined in footnote one are located in Figure 32) were also active in exploration; however, available markets will limit the number of mines. Most of the United States potash companies hold lands in Saskatchewan, as do French and German interests.

Four potash mines of the size of the two now being developed could produce current annual United States requirements of approximately 1.7 million tons. Clearly, new markets and new uses are necessary to develop fully the tremendous potential of this resource. One of the major efforts of the Chemistry Section of the Saskatchewan Research Council is devoted to the development of new products from the potash and salt deposits found in the province.

Markets and Competition

The greatest demand for potash will continue to be for fertilizers and the demand may be expected to increase with the long-term growth in agriculture. There has been a definite trend toward the production of 60 percent grade (K_2O content), which now represents about 90 percent of all potash deliveries for agricultural purposes. In 1955, world reserves, excluding Canada, were estimated at 37 billion tons of K_2O content, of which 65 percent were in Germany and Russia. The remainder was distributed as follows: Israel-Jordan, 23 percent; France, 6 percent; Spain, 6 percent; and the United States, 1 percent. The major consumer of potash in the Western World is the United States. Other important users are western Europe and Japan. Canadian consumption is about 100,000 tons annually.

1/ Continental Potash, National Potash, Duval Sulphur and Potash, Southwest Potash, U.S. Borax and Chemical, Winsall of Canada, General Petroleum of Canada, Commonwealth Potash and Chemical, Canadian Amco, Western Potash, Columbia Commonwealth, S.A.M. Explorations, Nation Potash, and Campana.

The long-term growth of potash consumption is accepted as certain, in spite of the fact that the present market is characterized by overexpansion. It is expected that demand will again catch up with supply in three to six years unless, of course, expansion such as that now under way in Saskatchewan is carried to excess. Assuming that no unforeseen mining problems are encountered, the Saskatchewan potash industry should compete well in the world market, although production will continue at established plants in New Mexico, California, Utah, and Michigan, as well as in Germany, Russia, Israel-Jordan, France, and Spain. Lower labor costs in those countries outside North America may be an increasingly important factor, particularly as their mines become more and more mechanized.

Saskatchewan production will have to compete with United States production from salt beds at Carlsbad, New Mexico, and from brines at Searles Lake, California, at Wendover Flats, Utah, and Michigan. In Utah, the Delhi-Taylor Oil Corporation in Grand County and Superior Oil Company in San Juan County have announced discoveries of high-grade potash beds. Exploration is in the early stages, but unconfirmed reports indicate that these deposits are at a depth of 2,000 to 3,400 feet, and consist of minerals more readily beneficiated than the Saskatchewan materials. However, Saskatchewan is in a preferred location to supply the United States Midwest market, the largest concentrated market for potash in the world.

With the completion of the International Minerals and Chemical Corporation's plant at Esterhazy in 1960, Saskatchewan will have a potash-producing capacity of 3,200 tons per day, or well over a million tons annually. At that time Saskatchewan will be second only to the Carlsbad mines which, until the Patience Lake development, supplied about 85 percent of the United States potash demand. However, mining at Carlsbad was initiated in 1931 and, as in most mining operations, the higher grade ores were worked first, so higher costs may be expected as the quality of available ores in this area decreases. Thus, it is expected that production at Carlsbad may be curtailed, at least until either new uses or new export markets can be found, or until North American consumption expands.

Further development of Saskatchewan's huge potash reserves is inevitable. However, in view of the current demand situation, it is unlikely that producing capacity will be increased for a few years. The timing of subsequent expansions will be governed by developments in other producing areas, such as Utah and West Germany, and other consuming areas, such as Japan. Tables 54 and 55 show the world pattern of production and consumption of potash. From these tables it can be seen that the big

Table 54

FREE WORLD PRODUCTION OF POTASH (K_2O Content)
1938 and 1950–1957
(Thousands of Metric Tons)

	1938	1950	1951	1952	1953	1954	1955	1956	1957
Free World	2,790.	4,800.	5,220.	5,700.	5,943.	6,662.	7,091.	7,319.	7,680.
Africa	—	—	—	—	—	—	—	—	—
America, North	288.	1,168.	1,288.	1,511.	1,734.	1,768.	1,887.	1,970.	2,056.[1/]
Canada	—	—	—	—	—	—	—	—	—
United States[2/]	288.	1,168.	1,288.	1,511.	1,734.	1,768.	1,887.	1,970.	2,056.[1/]
America, South	10.	—	—	12.0	0.3	0.5	10.0	10.9	10.0
Chile	10.	—	—	12.0	0.3	0.5	10.0	10.9	10.0
Asia	28.1	3.5	3.3	5.0	4.7	13.2	11.6	26.0	45.
China: Taiwan	—	—	—	—	—	—	—	—	—
India	3.9	2.7	2.6	4.3	1.4	1.5	—	—	—
Japan	0.2	0.8	0.7	0.7	0.3	0.7	0.6	—	—
Israel	24.	—	—	—	3.	11.	11.	26.	45.
Europe	2,455.	3,626.	3,918.4	4,170.5	4,204.4	4,880.6	5,182.8	5,311.6	5,569.
Belgium-Luxembourg	—	—	—	—	—	—	—	—	—
Denmark	—	—	—	—	—	—	—	—	—
France	579.	1,018.	988.	1,055.	1,030.	1,235.	1,353.	1,500.	1,576.
Germany									
West	1,861.	1,094.	1,324.	1,554.	1,579.	1,936.	2,020.	1,965.	1,987.
East		1,336.	1,409.	1,346.	1,378.	1,463.	1,552.	1,556.	1,604.
Italy	—	—	1.4	2.8	1.9	1.5	1.2	—	—
The Netherlands	—	—	—	—	—	—	—	—	—
Spain	15.	178.	196.	212.	215.	244.	256.	289.	402.
Sweden	—	—	—	0.7	0.5	1.1	0.6	1.6	—
United Kingdom	—	—	—	—	—	—	—	—	—
Oceania	—	—	—	—	—	—	—	—	—
Other Free World Areas	8.9	2.5	10.3	.15	—	—	—	—	—

1/ Figures from U.S. Dept. of the Interior, Mineral Industry Surveys MMS No. 2895, May 1959, converted to metric tons to conform with UN statistics.

2/ United States production in 1958 was 1,954 thousand metric tons.

Sources: Adapted from Statistical Yearbook, 1957, UN. 1957 figures: Statistical Yearbook, 1958, UN.

Table 55

FREE WORLD CONSUMPTION OF POTASH (K_2O Content)
1938 and 1950–1957
(Thousands of Metric Tons)

	1938	1950	1951	1952	1953	1954	1955	1956	1957
Free World	2,500.	3,800.	4,100.	4,600.	4,900.	5,400.	5,600.	5,900.	6,500.
Africa	13.9	6.0	26.9	28.2	22.3	29.1	41.6	38.7	25.9 1/
America, North	379.3	1,088.6	1,385.7	1,505.1	1,651.4	1,738.3	1,775.2	1,820.2	1,722.0
Canada	21.2	56.4	56.8	66.0	71.0	76.9	74.7	106.1	80.0
United States	357.0	1,020.0	1,311.0	1,434.0	1,578.0	1,661.0	1,691.0	1,700.8	1,622.5
Other	1.1	12.2	17.9	5.1	2.4	.4	9.5	13.3	19.5 2/
America, South	6.4	15.6	21.3	18.2	29.9	40.2	59.9	62.8	76.8
Chile	--	1.6	3.1	4.5	3.5	2.1	5.6	5.9	8.4
Other	6.4	14.0	18.2	13.7	26.4	38.1	54.3	56.9	68.4 3/
Asia	121.8	137.9	117.1	184.0	251.2	375.4	419.9	456.8	480.0
China: Taiwan	3.0	0.4	4.4	16.0	14.1	13.4	6.5	17.9	26.6
India	--	1.0	4.0	7.2	3.0	5.3	15.7	16.7	13.2
Japan	112.5	120.0	92.9	140.0	210.0	324.4	372.0	385.9	387.9
Israel	--	--	--	--	--	--	--	--	--
Other	6.3	16.5	15.8	20.8	24.1	32.3	25.7	36.3	52.3 4/
Europe	1,734.7	2,145.8	1,901.0	2,063.5	2,150.9	2,411.5	2,947.1	2,686.8	3,426.4
Belgium-Luxembourg	61.3	96.9	101.9	148.0	137.2	149.3	140.4	154.0	152.0
Denmark	45.8	84.1	103.0	130.4	153.4	152.2	144.7	157.1	157.4
France	306.3	354.6	390.2	411.0	370.6	450.6	517.8	581.3	679.1
Germany									
West	604.2	589.5	659.0	723.3	770.8	829.9	859.2	846.9	980.1
East	323	366	n.a.	n.a.	n.a.	n.a.	450	n.a.	n.a.
Italy	17.8	16.0	19.0	25.8	34.9	37.7	46.6	57.0	66.0
The Netherlands	119.7	153.0	155.0	160.0	157.9	162.4	146.1	165.4	151.3
Spain	28.1	35.0	35.0	55.0	46.5	74.6	69.4	82.4	82.0
Sweden	55.3	53.6	54.4	62.8	67.8	74.2	83.3	86.9	88.6
United Kingdom	75.0	239.0	230.0	172.3	235.0	256.4	259.0	312.0	345.0
Other	98.2	158.1	153.5	174.9	176.8	224.2	230.6	243.8	724.9 5/
Oceania	12.0	12.1	15.0	21.8	19.4	33.3	41.1	44.4	47.3
Other Free World Areas	231.9	394.0	633.0	779.2	774.9	772.2	315.2	709.3	721.6

1/ Includes Egypt (U.A.R.), North Africa (Algeria, Tunisia and former French Zone of Morocco), Union of South Africa.
2/ Includes Cuba and Mexico.
3/ Includes Brazil, Colombia, Peru.
4/ Includes Ceylon, Indonesia, South Korea, Philippines, Turkey.
5/ Includes Austria, Finland, Greece, Ireland, Norway, Portugal, Switzerland, Yugoslavia.

Sources: Adapted from Statistical Yearbook, 1957, UN. 1957 figures, Australia and New Zealand: Statistical Yearbook, 1958, UN.

deficit area is Asia, particularly Japan. The only other significant deficit areas are Africa, Australia, and New Zealand. Western Europe has a large surplus of production over consumption--a surplus amounting to approximately 1.6 million metric tons (K_2O content) in 1957. The most obvious overseas market for Saskatchewan potash is Japan. The major factor determining the competitive position of Saskatchewan relative to West Germany in supplying this market will be the cost of the rail haul to Vancouver. Saskatchewan producers may expect additional competition from West Germany in North American markets, also--the opening of the St. Lawrence Seaway has brought a number of markets on this continent within reach of West German producers. Hitherto they could compete only in Atlantic Coast markets; now they can extend into the Middle West.

Uses

At the present time the only use for potash, apart from fertilizers, is in chemicals--which in 1956 accounted for 4 percent of Canada's total potash consumption. Thus, in the absence of any new uses for potash, the only other industry which may be based on this resource, except mining and production of muriate of potash, is a chemical industry. Such an industry could use limited quantities of KCl in the production of certain potassium compounds. However, it is unlikely that a Saskatchewan plant would manufacture potassium chlorate or potassium hydroxide, as both require an electrolytic process and therefore a cheap source of power.

Sodium Sulphate

Major reserves of sodium sulphate were discovered in Saskatchewan in 1918. There are 21 known deposits and an estimated total reserve of 200 million tons. The deposits are of recent geologic origin, having developed through the accumulation of sodium sulphate in undrained lakes. The dissolved salts were carried into the lakes over long periods of time and became concentrated by the evaporation of the waters. The salts are harvested after freeze-up when heavy equipment can enter the reservoirs. The salts are heated in order to remove the water of crystallization and are changed to anhydrous Na_2SO_4.

In Canada, sodium sulphate is used mainly in the manufacture of kraft pulp. Table 56 shows the use of sodium sulphate in Canada and the United States.

Table 56

USES OF SODIUM SULPHATE IN NORTH AMERICA
(Percent)

Product Utilizing Na_2SO_4	Canada	United States
Kraft Pulp	> 95%	80%
Synthetic Detergents	< 2	5-10
Glass	< 3	5-10
Textiles	< 1	5
Miscellaneous (soda alum, sodium silicate, ceramics, stock feeds)	1	5
Total	100%	100%

Production

Five deposits (see Figure 32) are producing about 170,000 tons annually with a present value of $2.7 million. The producers are Midwest Chemicals at Whiteshore Lake, west of Saskatoon; Saskatchewan Minerals at Chaplin, Alsask, and Bishopric; Sybouts Sodium Sulphate, at Gladmar; and Ormiston Mining and Smelting Company at Ormiston. Table 57 shows production of sodium sulphate in Saskatchewan.

Table 57

PRODUCTION OF SODIUM SULPHATE IN SASKATCHEWAN
1956-1958

Year	Tons	Dollars
1956	181,053	$2,838,186
1957	157,800	2,568,728
1958	167,897	2,764,651

Source: General Review of the Mining Industry, 1957 and Preliminary Report on Mineral Production, 1958, D.B.S.

Saskatchewan has the capacity to increase production of sodium sulphate substantially if demand warrants and competition can be met. The Saskatchewan deposits provide a high-quality product, competitive with other natural deposits in refining costs. No other natural deposits exist in Canada. United States deposits, which occur in California, west Texas, and North Dakota, would have comparable production costs, so that the competitive position in relation to other natural sodium sulphate suppliers would depend largely on freight rates to the consumer.

Competition by Source of Supply

Major competition to natural sodium sulphate in the past has been from the by-product sodium sulphate. The sources of this material include (1) manufacture of hydrochloric acid from salt and sulphuric acid by the Mannheim process, (2) manufacture of hydrochloric acid by

the Hargreaves process, (3) production of regenerated cellulose including rayon and cellophane, (4) production of sodium bichromate, (5) production of phenol by the sulphonation process, (6) production of formic acid, and (7) production of lithium carbonate, chromic acid, and other materials.

New hydrochloric acid plants combine hydrogen and chlorine directly, and rayon is being replaced by nylon, orlon, and dynel; therefore by-product sodium sulphate is expected to decline in the long run. However, an important characteristic of by-product sodium sulphate production is its tendency under certain conditions to continue at high levels despite a sagging sodium sulphate market; this is because by-product sodium sulphate producers gear their production to the demand for the main product. It should also be expected that these producers will reduce the price as much as is necessary to sell all the salt cake they make. Therefore, the market for salt cake has been characterized by conditions of varying supply and attendant price fluctuations.

There is a possibility that imports of natural sodium sulphate from Germany could be resumed to replace by-product production. The future outlook for sodium sulphate in Saskatchewan depends largely on the kraft mill market, as well as on the competitive supply factors mentioned above.

Competition from Other Materials in the Pulp and Paper Market

Salt cake is used as an agent for digestion of noncellulose materials in the manufacture of kraft (sulphate) wood pulp. In the process, sodium sulphate is reduced to sodium sulphide, which is recovered for reuse. However, certain losses occur via effluent gases into the air, process waste water, and in the manufactured pulp itself, because of inefficient washing. These losses vary widely--currently from 80 to 225 pounds of salt cake per ton of pulp produced.

Due to a combination of economic and pollution considerations, the trend in salt cake use per ton of wood pulp produced is steadily downward. Average use of salt cake and salt cake replacement materials throughout the United States decreased from 206 pounds per ton in 1949 to 174 in 1954, or 15 percent during this period.[1/] This decrease in

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1/ According to the American Paper and Pulp Association.

use of salt cake results from the use of improved equipment[1/] and of materials to replace salt cake. According to a widely held opinion within the industry, sulphate pulp plants eventually may use as little as 75 to 80 pounds of salt cake per ton of pulp produced. Since the figure usually quoted includes salt cake replacements, the actual salt cake which would be used would be even less than 75 to 80 pounds.

Salt cake replacement materials include sodium sulphide from petroleum refining operations, sodium sulphate solutions from oil recovery plants, spinning solution from rayon plants, Glauber's salt, and liquor from semichemical (neutral sulphite) pulp mills.

Table 58 shows production and consumption of sulphate pulp and projections. It is estimated that by 1965 salt cake usage may decrease to an average of 110 to 120 pounds per ton of sulphate pulp. On the assumption that the average use of salt cake will be 120 pounds in 1965, the total consumption of salt cake by Canadian mills is expected to be approximately 170,000 tons. (The amount required by United States and Canadian pulp and paper mills, combined, to supply the United States market is estimated at about 1 million tons.) On the assumption that by 1975 average use of salt cake will be 100 pounds, the total consumption by Canadian pulp mills is estimated at 230,000 tons. (The amount required by United States and Canadian paper mills to supply the United States paper market at that time is estimated at approximately 1.2 million tons.) United States production of sodium sulphate is currently at approximately three-quarters of a million tons, with about a quarter of the United States salt cake requirements being imported. Thus, there is a substantial market in the United States which Saskatchewan salt cake can supply in competition with European sources. With the opening of the St. Lawrence Seaway, Saskatchewan may expect increasing competition from Europe in supplying mills in Ontario and the United States Midwest.

Saskatchewan is in an excellent position to supply the entire Canadian market and should continue to find a limited export market in the United States.

The market for sodium sulphate in industries other than pulp is expected to increase by about 50 percent over 1958 consumption by 1970, mainly in detergents, glass, and chemicals.

1/ Equipment improvement includes installation of scrubbers and precipitators for effluent gases, and expansion and improvement of evaporator and washing facilities.

Table 58

CANADIAN PULP PRODUCTION AND
UNITED STATES PULP CONSUMPTION
1951-1975
(Millions of Tons)

Year	Canada		United States Consumption	
	Total Pulp Capacity	Sulphate Pulp Production	Total Pulp	Sulphate Pulp
1951	9.5	1.1	18.5	9.3
1952	10.1	1.1	18.1	9.2
1953	10.1	1.2	19.6	10.3
1954	10.5	1.4	19.9	10.5
1955	10.8	1.4	22.4	11.9
1956	11.3	1.6	24.0	12.9
1957	12.2	1.7	23.4	12.9
1960	17.1	2.1	27.0	14.8
1965	23.3	2.8	32.7	18.1
1970	30.5	3.7	38.8	21.6
1975	38.7	4.6	46.1	25.9

Sources: Wood Pulp Statistics, 1958, U.S. Pulp Producers Association. Projections by Stanford Research Institute.

Potential industries in Saskatchewan, which might be partially based on the sodium sulphate resources of the province, are the manufacturing of chemicals and dyestuffs, detergents, stock feeds, and leather tanning. However, the quantity of sodium sulphate required by these industries is insignificant, and therefore the proximity of the resource would not be an important factor in their location.

Sodium Chloride

Sodium chloride, or common salt, is found associated with potash in the Prairie Evaporites where it is even more abundant than potash. The area of possible production coincides with the area shown in Figure 32 as favorable for potash production. Present production of sodium chloride is limited by demand to one deposit located in western Saskatchewan, at Unity. The Sifto Salt Company Limited, a subsidiary of the Dominion Tar and Chemical Company, Limited, recovers the salt by pumping fresh water into one well and forcing it through the salt formation to another well, through which it returns to the surface as a nearly saturated solution. In 1958, this plant produced an estimated 45,500 tons of finished salt products with a value of nearly $1.3 million.

Future production of salt in Saskatchewan is limited only by markets. Each mine of a size comparable with that of the Potash Company of America's mine at Patience Lake will produce, in addition to potash, about 2,500 tons of sodium chloride per day. Compared with the 120 tons per day produced by the Unity Company, the output of which is limited by the present market, it is evident that each potash mine will produce about 20 times as much sodium chloride as the present market can absorb. Even if the market existed, however, mining or "pumping" from pure salt beds would be cheaper than refining the by-product salt from the potash mines.

There is little potential for any large expansion in the production of table salt, and the major potential industrial use in the Prairie Provinces is in the manufacture of chlorine, caustic, and hydrochloric acid.

In January 1959, Dow Chemical announced the purchase of a plant site near Edmonton, Alberta, and Western Chemicals is enlarging its Duvernay plant by 50 percent. Both these plants will use salt and natural gas to produce caustic soda, chlorine, and phenol. Other products under consideration by Dow are hydrochloric acid, glycols, and plastic foam. The daily production of the enlarged Duvernay plant will be 65 tons of caustic soda, and 60 tons of chlorine. Similar developments in the chemical

field could be started in Saskatchewan, although the larger quantities of gas in Alberta tend to make that area more favorable.

The continued growth and expansion of western Canada's pulp and paper industry and the other nonchemical industries which presently consume the majority of chlorine, caustic, and hydrochloric acid will create a market demand sufficient at some future date to justify the construction of additional chlorine-caustic capacity in the Prairie area. Great interest in such an action has already been evidenced by many companies. Groups promoting large pulp mills in the Prairie Provinces have advocated simultaneous construction of nearby captive chemical facilities. Chemical companies active in eastern Canada have considered western expansion. Chemical companies with no Canadian facilities have also considered such a move as a logical means to become more active in the Canadian market. Plant justification by chemical companies has been on the basis of direct sale of chlorine and caustic to consuming industries, as well as on captive consumption for chemical manufacture. Since the amount of investment now required for a pulp and paper mill is quite large ($100,000 per daily ton of capacity), the pulp companies have not given as serious consideration to the construction of chlorine-caustic plants as have the chemical companies.

The location of future chlorine-caustic plants can be influenced by raw material costs, but salt availability does not appear critical. Salt is now commercially mined in all three Prairie Provinces.

Power costs can also be significant to the location of such plants. All provinces in western Canada have energy resources of water, coal, natural gas,[1/] and petroleum, which can be used for the generation of electricity. Since salt and energy resources are accessible throughout the Prairie Provinces, it is almost impossible to say that any area is a prime location for a potential chlorine-caustic plant.

Thus, future chlorine-caustic plants in western Canada will probably be constructed where they can best serve regional markets. Growth of market demand in the Prairie Provinces and in western Ontario will justify additional capacity. Proximity to Alberta may delay establishment of a plant in Saskatchewan because of the expansion potential for

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1/ Natural gas is being used for power generation, but rising demands for gas in eastern Canada and the United States are increasing its market value.

an existing Alberta producer. Captive production to supply a large bleached pulp mill could be justified quite readily if a plant in Saskatchewan had a surplus of available electric power.

Clay

There are hundreds of clay occurrences in Saskatchewan varying in age from Cretaceous to Recent.[1/] Clays suitable for common brick and building tile are found in many places and some deposits are measured in millions of tons. Reserves of 940,000 tons of high-grade ball clays have been proven in the Cretaceous of the Willow Bunch and Wood Mountain area, but attempts to produce pottery from these clays have been unsuccessful. However, plans are under way by National Industrial Minerals at present to develop production from this area. Bloating clays suitable for lightweight aggregate products are found in lake beds, with those around Regina and Swift Current producing a uniform and high-grade aggregate.

In 1955, three companies utilizing clays for brick and tile manufacture were in operation in the province at Estevan, Claybank, and Bruno (see Figure 32). The value of production at that time was $900,000, with clay valued at $50,000 being exported to Alberta. Operations expanded greatly in 1957 with the addition of a cement plant, a sewer pipe and flue-lining plant, and two lightweight aggregate plants at Regina. By 1958, value of production had reached an estimated $5.9 million.

Three bloating clay properties are operating in the province. Concrete blocks are produced using lightweight aggregates, and these have gained wide acceptance by the local construction industry. Apart from the planned pottery industry, expanded utilization of Saskatchewan's clay resources appears most likely to take place in the form of increased output of products currently under manufacture.

Sand and Gravel

Glacial deposits are widespread in the southern half of Saskatchewan and these provide sand and gravel for construction purposes in most

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1/ Worcester, W. G., Clay Resources of Saskatchewan, Technical & Economic Series, Report No. 2, 1950.

areas except for a few localities such as in and around Regina where glacial deposits consist of lake beds of gumbo clays. Production of sand and gravel in 1958 amounted to 6.4 million tons with a value of $3.1 million. Further expansion of this industry is directly related to provincial development, particularly construction.

Bentonite

Bentonite clays are used as muds for oil-well drilling and for refining petroleum and vegetable oils. Saskatchewan has a number of deposits of this mineral which have been investigated extensively,[1/] and eventual production seems possible from both the swelling and nonswelling types.

Calcium-bentonite (nonswelling) is found in the Vermilion River formation (Upper Cretaceous) and the Riding Mountain formation (later Upper Cretaceous) in eastern Saskatchewan. This mineral produces an excellent material for oil decolorizing when activated. There is also limited use for this material in food processing.

Swelling bentonites are found in south-central Saskatchewan near St. Victor, Rockglen, and in Big Muddy Valley. This material, with proper treatment involving intensive mulling and the addition of sodium carbonate, produces a mud with characteristics at least as good as regular bentonite. Expanded refinery capacity in Canada would provide a market for this product. Major competition to Saskatchewan production would be provided by Pembina Mountain Clay Limited's plant in Winnipeg and by imports from the United States.

The major applications of swelling bentonites are in oil-well drilling fluids and in moulding sand used in foundries. Other, more minor uses include paper filters, detergents, and carriers for insecticides. At the present time, however, oil-well drilling accounts for about two-thirds of Canadian consumption. The Saskatchewan Government's Industrial Development Office has completed a study of opportunities for processing swelling bentonite in the province.

1/ Tomkins, R. V., et al, Improving Saskatchewan Swelling Bentonites by Chemical and Mechanical Treatment, Department of Investigators No. 3, Department of Mineral Resources, Saskatchewan, 1954.

Pumicite

Pumicite is a volcanic ash material consisting of small angular particles of glass that are used in the manufacture of abrasives and scouring or polishing compounds. When mixed with cement, pumicite acts as a pozzuolana to improve concrete, being particularly effective in contributing to watertightness and reduction of heating.

Pumicite is found in several localities near Swift Current and also in south-central Saskatchewan at St. Victor and Rockglen. Reserves are still indefinite and based upon limited information, but drilling results indicate that in general deposits are small, discontinuous, and interlain with bentonite and other materials. Further drilling will be necessary before expenditure on a processing plant is justified for the development of this resource. The largest reported reserve is 2 million tons at Rockglen.

All deposits are reported as being under lease, but no production appears imminent. The major market outlets for pumicite would be (1) as an abrasive additive to cleansers and soaps, and (2) as lightweight aggregate.

Limestone and Marl

There are extensive occurrences of limestone in the province, most of which are covered by varying depths of later rocks. The surface exposures are in the northeastern part of the sedimentary belt but are neither well located nor of sufficiently good grade to encourage development at the present time. The buried limestone formations in the south are widespread but are generally too deep for profitable mining; for example, limestones are found at a depth of 3,000 feet under Regina.

As production expands, or is considered for other areas, information should be assembled giving depths and compositions of favorable cement, metallurgical, and chemical-grade limestones. This will become of increasing importance when the steel industry expands. Ample supplies of limestone, water, and fuel, as well as iron ore, should be available nearby for maximum efficiency and economy of steel production.

There is a well-established market for limestone in the province, with potential increases in consumption likely. As the province develops, there will be increasing demand for limestone in roadmaking, as an aggregate in concrete, in agriculture, and in cement manufacture. Other potential developments that would increase limestone consumption

are: the establishment of a pulp and paper mill, the construction of a sugar refinery, and the establishment of an iron processing plant. Increase in demand will require either larger imports from Manitoba, mining of limestones from depth, or use of marl deposits.

Another source of lime is from marl deposits scattered throughout the province, the largest and best of which occurs at Sturgeon Lake, 20 miles northwest of Prince Albert. This is a recent lake deposit estimated at 23 million tons containing 35 percent or more calcium carbonate and 18.3 million tons containing 50 percent or more calcium carbonate.

The grade of the marl when calcined is 39 percent silica and only 46 percent lime; the grade would have to be increased to 60 to 65 percent lime and the silica reduced to 20 to 25 percent by mixing with high-grade limestone for the marl to reach Portland Cement specifications. The nearest known source of high-grade limestone occurs in the Devonian series at Mafeking, Manitoba, which is the source of present Saskatchewan imports.

The eventual utilization of the marl resource seems possible because of the scarcity of accessible limestone resources in Saskatchewan.

Thus, with a freight advantage and an assured market, the only factors limiting development are cost of extraction and low lime content of much of the stone and marl.

Silica Sand

Examinations conducted in Saskatchewan indicate that large quantities of sands are available for the glass industry. Sands of good quality are found on the Red Deer River in east-central Saskatchewan and at Wapawekka Lake east of Lac La Ronge (Figure 32). These occur in the Jurassic Swan River group.

The limitations of the local market and the high transportation costs to outside markets may prevent development of these deposits in the near future. The Saskatchewan Government's Industrial Development Office has made a study of opportunities for the manufacture of pressed and blown glass and glassware in the province.

Magnesium

In Saskatchewan, magnesium is found in the waters of six lakes within a radius of 100 miles of Saskatoon. The amount of magnesium present in the waters of these lakes is indicated in Table 59.

Table 59

MAGNESIUM IN LAKE WATERS IN SASKATCHEWAN

Lake	Area (acres)	Depth (feet)	Magnesium	
			Tons (thousands)	Percentage by Weight
Big Quill	64,000	4.3	2,200	0.56%
Redberry	15,800	43.4	1,850	0.19
Basin	13,600	29.0	850	0.16
Little Manitou	3,100	2.8	325	2.3
Arona	1,720	8.3	120	0.58
Muskiki	4,480	1.1	110	1.36
Total			5,455	

The magnesium from these lakes could be recovered by precipitation as magnesium hydroxide or, where the concentration is higher and other salts would be by-products, by controlled crystallization and evaporation.

Magnesium is also found in the Prairie Evaporite formation of the Middle Devonian associated with the potash and salt deposits in the form of carnallite, a potassium-magnesium chloride. The Potash Company of America is investigating one area 100 miles east of Saskatoon believed to contain considerable thicknesses of carnallite-bearing salts. Other localities are known to contain minable thicknesses of massive carnallite. The presence of these salt beds offers the possibility of commercial production of magnesium chloride hexahydrate.

Production

Major deposits of magnesite are found in Washington and Nevada, and a large brucite deposit is also found in Nevada. In Canada, a large magnesite deposit occurs in British Columbia and high-line magnesite and a 30 percent brucite deposit in limestone are being mined in Quebec. Magnesium salts are produced from sea water by two plants in California, one in Texas, and one in New Jersey.

Magnesium chloride is present in most natural brines and in salt deposits formed from sea water. It is available in many parts of the world from "bittern," the impure solution remaining after separation of table or industrial salt (NaCl) by evaporation of sea water. Deposits of carnallite, $KCl-MgCl_2 6H_2O$, at Stassfurt, Germany, are said to be the greatest concentrated source of magnesium chloride in the world. The underground brines of Dow Chemical at Midland, Michigan, are the main continuing source of magnesium chloride in the United States, and several existing large plants for production from sea water may be put into operation, if required by market conditions.

The United States has the world's largest installed capacity for magnesium chloride production. This capacity is at least 2.8 million tons of hexahydrate, the amount produced in 1943 when wartime demand for magnesium metal production was at its peak. Production during recent years has been comparatively small.

Germany has traditionally been the world's largest peacetime producer of magnesium chloride, with sufficient production to fill her own needs and make 13,000 to 16,000 tons available annually for export. France produces magnesium chloride for her magnesium industry and has a surplus for sale to other countries.

During the war, Canada, the United Kingdom, and Brazil were producing magnesium chloride for export, but none of these countries is significant in current export trade. Many other countries located on oceans or inland seas could undertake production from these bodies of water without great difficulty.

Use

During periods of high demand for magnesium metal, the largest single use of magnesium chloride hexahydrate (the customary commercial form) is for conversion to anhydrous magnesium chloride for metal production.

Other uses for hexahydrate include the production of oxychloride cement, wall plaster compositions, fireproofing of wood, dust binder for roads, cotton defoliation, refrigeration brines, floor-sweeping compounds, and fire-extinguishing mixtures.

Successful research in developing new uses for magnesium metal and promotion by the magnesium industry have resulted in an increasing demand. In North America, consumption of magnesium metal increased from 26,000 tons in 1950 to 65,000 tons in 1956, an annual growth rate of 14 percent, and present developments in space exploration are also increasing the demand. Almost a third of the use of magnesium in 1956 was as a raw material in the production of two other metals--titanium and zirconium.

Magnesium is used in extrusions and cast forms where weight-saving--it being 35 percent lighter than aluminum--is of critical importance. Its value as an alloying agent with other metals in electrochemistry and metallurgy tends to make it an increasing competitor of aluminum, copper, lead, and zinc in many industries.

In structural applications, however, magnesium's use has been limited by low corrosion resistance, low tensile strength, and resistance to cold working. Another important use for magnesium compounds is for refractories which, in Canada, are made from dead-burned magnesite, brucite, or dolomite.

In 1955, magnesium metal production in the United States consumed approximately 62,000 tons of anhydrous magnesium chloride, roughly equivalent to 135,000 tons of hexahydrate. Consumption in other countries for this usage is comparatively small at present.

The United Kingdom is the largest importer of magnesium chloride in any form, on the order of 12,000 to 15,000 tons annually. The Netherlands, Italy, and Austria import some 2,000 to 4,000 tons yearly, primarily from France and West Germany.

United States imports of magnesium chloride are an insignificant 200 tons yearly, almost all from Germany. Imports by Latin American countries are individually quite small, and the total for the area is probably well under 500 tons per year.

Canadian producers could compete on the limited United States market, and possibly gain parts of the United Kingdom market. The domestic market is not large, although demand is likely to expand. The establishment of large metallurgical and chemical industries in western

Canada strengthens the case for developing the province's magnesium resources for possible production of magnesium compounds or magnesium metal.

The potential for economic production of magnesium salts, either from lakes or salt beds, appears to be sufficiently good over the long term that investigation seems warranted, in view of projected increased demand for this metal.

The cost of production and of transportation to consuming centers would have to be investigated carefully to determine whether a reasonable profit could be expected. The major competitors of potential Saskatchewan producers would be the plants producing from sea water, which, although utilizing water with lower magnesium concentrations than those found in the Saskatchewan lakes, currently have excess capacity and are close to the largest markets. However, any Saskatchewan production probably would be oriented to markets in the United States Midwest and western Canada.

Industries based on Saskatchewan's magnesium resources would be primarily in extraction and refining to produce magnesium compounds and possibly magnesium metal. Although these products in themselves would not provide the basis for additional industries in the province, they would provide important ingredients for a possible chemical industry.

Helium

The commercial production of helium is currently under study by the British-American Oil Company Limited which is carrying out exploration and development work on 171,000 acres north of Swift Current. Helium is used in certain defense projects, such as missiles, for inflating balloons and similar craft, and as protective agent for working with radioactive rays. At present the western world obtains its supply from four plants in the United States, and two additional plants are under construction--one in Oklahoma, and one in Texas.

Helium is in short supply, and the United States government would like to see a substantial increase in the 1958 production of 360 million cubic feet, with the objective of producing 3 billion cubic feet annually.

Summary of Potential for Industrial Minerals

The growth potential of mineral production from the sedimentary rocks of the southern half of Saskatchewan can be predicted with more assurance than can production of minerals from the Precambrian. In the case of potash minerals, for example, the reserves of high-grade materials are so great that expansion of production is dependent only upon limitations of market and the extent to which the mining, refining, and transportation costs permit competition with other world sources.

Sodium sulphate production should experience some long-term growth depending on changes in methods of pulp production and also upon the resumption of imports from Germany.

Sodium chloride, building clays, and sand and gravel are found in sufficient abundance and quality that production is governed only by demand.

Bentonite, pumicite, limestone, and silica sand, because of either limited size or remote location of deposits or poor quality of the material, have poor immediate potential, although some of these may be developed as present sources are exhausted or demand increases.

Fuel Minerals

The fuel minerals, lignite, petroleum, and natural gas, like the industrial minerals, are found in the southern part of the province. Short-term prospects are for rapid development of these resources relative to the metallic minerals of the north. Oil expansion seems assured although, at present, development has leveled off owing largely to world-wide overproduction in the industry. Exploration activity has also fallen off sharply because of this oversupply situation and the industry's failure to make a major discovery for some time. Natural gas production is closely related to oil production, but in Saskatchewan gas reserves as yet have not proved adequate to make the province self-sufficient. Nevertheless, production has increased considerably in the last few years. Coal production has increased substantially since 1945 but has remained at about the same level for the past eight or nine years. Expansion of coal production is currently under way, and is expected to double by 1965 to provide energy for increased power generation. The supply situation of these minerals makes Saskatchewan one of Canada's richest provinces in energy sources.

Petroleum and Natural Gas

The first commercial gas well in Saskatchewan was completed at Lloydminster in 1934 and the town became the first in the province to use natural gas as a fuel. By the end of 1936, four producing gas wells had been found.

The Lloydminster area was the focal point again in 1936 when oil was discovered, although it was not until 1944 that oil was produced from the field. The main exploration for oil began in 1948, gained momentum in 1951, and reached a climax in 1956 and 1957.

Oil and gas have been found in five stratigraphic horizons. Lloydminster, Coleville-Smiley, and associated pools west of Saskatoon are all mainly in the Lower Cretaceous, with minor production from the Mississippian. In the southwestern part of the province, production of oil and gas is largely from the Jurassic with some from the Lower Cretaceous. At the Hatton field on the Alberta border, production of gas is from the Upper Cretaceous. In the southeast, oil production is mainly from the Mississippian save for minor production at Wapella from the Lower Cretaceous and the Jurassic. In addition, a well near Minton, in south-central Saskatchewan, has yielded oil in the Ordovician.

The best oils in the province are found in southeast Saskatchewan, where API gravities average 37 to 40 degrees. The Lloydminster oils are the least desirable, some fields averaging as low as 12 to 15 degrees. The fields in the southwest are intermediate, averaging 21 to 24 degrees.

Production of Crude Oil and Natural Gas

The petroleum industry is relatively new in Saskatchewan; Table 60 shows the rapid rate of growth in the last fourteen years. Expansion at almost the same rate has taken place in natural gas but on a much smaller scale (see Table 61).

Reserves of Crude Oil and Natural Gas

The following tables provide information on oil potential in Saskatchewan. Table 62 shows estimated future oil production potential in Saskatchewan for the years 1959-1965. Table 63 gives some idea of possibilities in the more distant future, showing projected recoverable crude oil reserves.

Table 60

SASKATCHEWAN CRUDE OIL PRODUCTION
1945-1958

Year	Volume (barrels)	Value
1945	16,508	$ 15,000
1946	136,887	123,000
1947	521,100	537,000
1948	842,902	897,000
1949	780,170	709,000
1950	1,039,523	929,000
1951	1,247,395	1,460,000
1952	1,696,946	2,046,000
1953	2,791,472	3,483,000
1954	5,422,899	7,637,000
1955	11,317,168	17,480,000
1956	21,077,371	34,943,000
1957	36,861,000	79,325,064
1958	46,500,000	100,905,000

Sources: 1945-56 - Saskatchewan Economic Review, 1959.
1957-58 - Preliminary Report on Mineral Production, 1958, D.B.S.

Table 61

SASKATCHEWAN NATURAL GAS PRODUCTION
1945-1958

Year	Volume of Sales (millions of cubic feet)	Value of Sales
1945	170	$ 16,000
1946	238	23,000
1947	261	25,000
1948	437	43,000
1949	472	46,000
1950	816	80,000
1951	861	85,000
1952	1,131	119,000
1953	1,549	162,000
1954	3,087	310,000
1955	6,062	561,000
1956	8,785	806,000
1957	11,962	1,105,000
1958	16,509	1,525,000

Source: Saskatchewan Economic Review, 1959.

Table 62

ESTIMATED FUTURE OIL PRODUCTION POTENTIAL IN SASKATCHEWAN
1959-1965
(Millions of Barrels)

Year	Type of Oil			
	Light	Medium	Heavy	Total
1959	35.6	34.5	3.7	73.8
1960	42.2	38.6	3.5	84.3
1961	48.7	41.0	3.4	93.1
1962	55.2	42.0	3.2	100.4
1963	59.6	42.4	3.0	105.0
1964	61.6	41.5	2.8	105.9
1965	62.5	40.5	2.6	105.6

Source: Petroleum and Natural Gas in Saskatchewan, a submission to the Royal Commission on Energy by the government of Saskatchewan, April 1958.

The estimates of reserves are based upon the available volume of favorable reservoir sediments, and assumes that demand will be sufficient to maintain active exploratory well-drilling.

The projection of crude oil reserves made in the government submission (Table 63) was prepared during the greatest oil boom experienced by the province. Subsequently, exploration has subsided and indications are that reserves and production will not be developed at as rapid a rate as was previously indicated. It is estimated that total developed recoverable reserves by 1970 will be between 1 and 1.5 billion barrels, and that the annual production potential at maximum permissive rates will be between 70 and 100 million barrels.

Table 63

SASKATCHEWAN RECOVERABLE CRUDE OIL RESERVES
1956-1970
(Billions of Barrels)

Year	Type of Oil			
	Light	Medium	Heavy	Total
1956	0.24	0.33	0.07	0.64
1957	0.31	.34	.03	0.68
1958	0.36	.27	.03	0.66
1960	0.58	.57	.06	1.21
1965	1.00	.81	.06	1.87
1970	1.21	0.92	0.08	2.20

Sources: 1956-58 - Petroleum and Natural Gas Statistical Year Books 1956-58, Province of Saskatchewan.

1960-70 - Petroleum and Natural Gas in Saskatchewan, a submission to the Royal Commission on Energy by the government of Saskatchewan, April 1958, Figure 1, Appendix X.

Figure 32 locates five areas believed to be most favorable for petroleum exploration.[1/] Table 64 provides an estimate of future discoveries: Areas A, B, C, and D are different horizons in the Mississippian; E is in the Silurian.

1/ Data provided by Mr. David R. Francis of the Petroleum and Natural Gas Section of the Saskatchewan Department of Mineral Resources.

Table 64

SOURCE AND VOLUME OF ESTIMATED DISCOVERABLE OIL
(Millions of Barrels)

Area	Period	Estimated Discoverable Oil		
		In Place	20 Percent Recovery	Recoverable[1/]
A	Mississippian	230	46	36.8
B	Mississippian	200	40	32.0
C	Mississippian	70	14	11.2
D	Mississippian	2,800	560	448.0
E	Silurian	1,240	248	198.4
Total		4,540	908	726.4

Source: Petroleum and Natural Gas in Saskatchewan, a submission to the Royal Commission on Energy by the government of Saskatchewan, April 1958.

Present recoverable gas reserves in Saskatchewan have been estimated at 1,136 billion cubic feet consisting of 691 billion cubic feet from gas fields and 445 billion cubic feet from oil fields. Possible additions to recoverable gas reserves are estimated at 1,840 billion cubic feet, consisting of 140 billion cubic feet from gas fields and 1,700 billion cubic feet from gas associated with oil fields. This results in a total of 2,976 billion cubic feet of proven and possible recoverable gas. In 1958, production of natural gas amounted to an estimated 16.5 billion cubic feet valued at $1.5 million.

On the basis of the 1,136 billion cubic feet of recoverable gas reserves, and the 1958 production of 16.5 billion cubic feet, the

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1/ Allowing for 20 percent shrinkage when brought to the surface.

indicated reserve-production ratio for last year was slightly under 70 years. Normally, if additions to reserves are adequate, a ratio of this magnitude can support a higher gas production; in the United States, for example, the reserve-production ratio is about 22 years. On closer examination, however, a provincial production based on a 22-year reserve-production ratio could not be tolerated without seriously jeopardizing Saskatchewan's existing gas reserve position. For example, if the 1,840 billion cubic feet of possible additions to reserves is a realistic ultimate, and if these additions were spread over, say, the next 50 years (i.e., 37 billion cubic feet per year), then present production can only be increased another 20 billion cubic feet per year. At that level, annual production would approximately match yearly reserve additions.

Saskatchewan's Fuel Outlook

To estimate the adequacy of Saskatchewan's supply of fuel, it is necessary to project the province's requirements of fuel and how these requirements will be met. Requirements can be estimated most readily by types of use: domestic and commercial, industrial, and transportation. Fuel sources can be matched to these requirements by estimating the portion of demand that will be supplied by each type of fuel. This presupposes an assumption of price for fuels in competing uses.

Saskatchewan's Fuel Energy Requirements. Table 65 summarizes actual fuel energy requirements for Saskatchewan for 1950 and 1957 and estimates for the 1965-75 period, by type of use.

Total fuel energy demand is expected to increase about 60 percent between 1957 and 1975. The growth in energy requirements to 1975 is based on population projections and on the continuation of increasing per capita energy consumption characteristic of the postwar period.

Domestic and commercial use of energy has shown almost no change in the province during the postwar period. This is explained by the fact that coal and wood have been replaced to an ever-increasing extent by oil and natural gas, and efficiency of heating equipment for those fuels has been continuously improved. In 1950, coal and wood supplied 82 percent of this market; in 1957 they supplied only 28 percent. For the future, as substitution of coal and wood-burning equipment is completed and the improvement of heating efficiency levels off, demand for energy for domestic and commercial use should start to increase again.

Table 65

ENERGY REQUIREMENTS IN SASKATCHEWAN, BY TYPE OF USE
1950-1975
(Trillions of Btu)

Energy Use	1950	1957	1965	1970	1975
Domestic and Commercial	38	39	45	49	54
Industrial	20	37	54	61	67
Transportation	56	61	74	85	99
Total	114	137	173	195	220

Sources: 1950-57 - Various D.B.S. publications.
1965-75 - Stanford Research Institute.

Industrial use of energy has shown nearly a 90 percent increase during the 1950-57 period, with thermal-electric generating plants and all other industry sharing equally in the increase, and each taking about 50 percent of the fuel. For the future, however, very little increase in demand is expected in the "other industry" category, whereas demand for energy by the thermal-electric generating plants should continue to increase markedly. In fact, by 1975, it is expected that this category will represent at least 60 percent of total industrial energy requirements.

Transportation use of energy is dominated by road use (95 percent motor gasoline). In 1957 road use represented roughly 75 percent of transportation use, and about the same percentage is estimated for 1975. The only other major transportation use is for railroads. Although rail traffic has increased, there has been a downward trend in this use as efficiency has improved, first, when heavy fuel oil replaced coal as the principal fuel, then as diesel oil replaced heavy fuel oil. Conversion to diesel and concomitant improvements in efficiency are essentially completed, so that in the future the energy requirements of the railroads should once again show an increase.

Saskatchewan's Fuel Energy Sources. Table 66 summarizes actual fuel energy requirements for Saskatchewan for 1950 and 1957 and estimates for the 1965-75 period, by type of fuel.

Table 66

ENERGY REQUIREMENTS IN SASKATCHEWAN, BY TYPE OF FUEL
1950-1975
(Trillions of Btu)

Energy Source	1950	1957	1965	1970	1975
Petroleum	51	89	115	128	141
Coal	56	32	18	14	10
Natural Gas	1	12	38	52	68
Wood	6	4	2	1	1
Total	114	137	173	195	220

Sources: 1950-57 - Various D.B.S. publications.
1965-75 - Stanford Research Institute.

Coal and petroleum products have been the principal energy sources for the province in the past. For the future, however, competition from natural gas will deter the growth of petroleum products demand--middle distillates and heavy fuel oil--and will definitely bring about further declines in the demand for coal. Wood, used almost entirely in the domestic and commercial market, is expected to drop out of the energy picture almost completely by 1975.

Provincial supplies of all types of energy except natural gas are more than ample, and consequently, with this one exception, reported movements of energy sources into and out of the province are more in the nature of convenient interchanges between producers and consumers than a real requirement. In 1955, the province became a net exporter of energy. This situation can be expected to continue in the case of oil but not in the case of gas and coal. Because the cost of its transportation is high, coal can be moved only relatively short distances, and therefore its production must be geared to the provincial demand. Apart from utilization

by steam generating plants, the outlook for coal is certainly not bright in the face of increasing competition from oil and particularly, from natural gas.

Although Saskatchewan has substantial reserves of natural gas--in fact, sufficient to supply the projected provincial demand until approximately 1970, without a draw down on total gas reserves--the fact that the Saskatchewan Power Corporation is planning to sell approximately 7 billion cubic feet of gas per year to the Trans-Canada pipeline for export to eastern Canada makes the reserve situation anything but bright. Consequently, it is probable that in the not too distant future increasing quantities of gas from Alberta will be needed to supplement production in the province to meet Saskatchewan's long-term requirements for natural gas. Such action is possible because Trans-Canada's pipeline crosses Saskatchewan Power Corporation's gas transmission system in several places. For the long-run, it appears that Saskatchewan is bound to be a net importer of gas.

Saskatchewan's Future Role in Export of Petroleum and Natural Gas

Saskatchewan is favorably placed with regard to the export of its crude oil to Ontario and the United States. Indeed, only a fraction of its production finds its way into Saskatchewan refineries. Since much of Saskatchewan's oil production is located to the east of the major refining centers in the province, and is accessible to the Interprovincial pipeline, it is logical that this crude oil moves to eastern markets, both in Canada and in the United States. Table 67 indicates the markets for Saskatchewan crude.

Thus far, markets have been developed to a greater degree in Ontario than in the United States and Saskatchewan can probably expect a steady increase in sales in this area. The Ontario market, however, is not unlimited and is increasing at present at an annual rate of no more than 6 percent. Then again, Saskatchewan may appear to be in a geographically favorable position with regard to the saturation of this market but its sales remain governed to a large degree by the extent to which Saskatchewan crudes can be blended with Alberta crudes to bring the sulfur content within limits acceptable to Ontario refineries.

In the north-central United States, on the other hand, Saskatchewan sales are limited mainly by refinery capacities, and increases occur spasmodically and rather sharply. A number of refineries in this

Table 67

PRINCIPAL MARKETS FOR SASKATCHEWAN CRUDE OIL
1954-1958
(Thousands of Barrels)

Year	Saskatchewan Refineries	Ontario	Manitoba	United States
1954	3,237	129	2	--
1955	4,985	547	12	2,471
1956	6,788	4,099	558	6,964
1957	5,289	14,210	3,906	11,758
1958	4,091	17,716	7,742	14,283

Source: Saskatchewan Economic Review, 1959.

area are designed especially to handle sour medium-gravity crudes of the type produced in the Fosterton area. This being the case, it can be said that Saskatchewan crude enjoys a certain competitive advantage over United States and foreign crudes in this area and is almost in the position of possessing a captive market--because it is unlikely that these refineries will go to the expense of modifying their refinery processes in order to change to other types of crude which may be slightly cheaper. Another point worthy of mention is that sour medium-gravity crudes have decided advantages over sweet light crudes in certain circumstances owing to their larger content of sulfur, paraffin, and asphalt. Such crudes are very acceptable to refineries in the heavily industrialized areas of the United States Midwest to which Saskatchewan sells its products.

Saskatchewan producers have lower production costs than those in Alberta because wells are shallower. However, indications are that the ratio of dry to productive holes will increase in Saskatchewan relative to Alberta, thus reducing the cost advantage.

Saskatchewan refineries, by and large, find transportation costs less if they purchase crude from Alberta rather than from their own province. Consequently about three-quarters of their supplies are purchased from that province. Table 68 shows the crude oil consumption of Saskatchewan refineries.

Table 68

CONSUMPTION OF CRUDE OIL
BY SASKATCHEWAN REFINERIES
1950-1958

Year	Crude Oil (barrels)
1950	9,863,784
1951	11,466,123
1952	12,291,569
1953	15,643,547
1954	17,051,930
1955	18,377,363
1956	19,856,376
1957	19,509,214
1958	17,097,686

Source: Petroleum and Natural Gas Statistical Year Book, Saskatchewan Department of Mineral Resources.

In 1958 the oil and gas industry in Canada as a whole suffered a setback which is ascribed generally to (1) the loss of crude oil markets in the United States, (2) a failure to make further inroads into the eastern Canadian market for imported crudes from South America, (3) a somewhat less than expected increase in domestic demand, and (4) the delay on the part of the federal government in authorizing the export of additional natural gas. The industry in Saskatchewan, however, was not affected to any noticeable degree and production in the province continued to increase. However, some concern is justified regarding the immediate state of exploration activity in the province. Estimated expenditures on surveying and wildcatting were lower in 1958 and are expected to decrease still further in 1959 and 1960.

Crude oil production in Canada in 1958 was only about half the country's potential under sound conservation practices, however, this potential became overexpanded because of the stimuli arising out of the Suez crisis. The natural gas situation continues to be complicated by restrictions on exports to the United States, but markets in the Prairie Provinces and eastern Canada continue to expand. Saskatchewan is not faced with this problem as it cannot fill its own requirements of natural gas but must purchase from Alberta and from Trans-Canada. Production in Saskatchewan is increasing quite substantially, however, as more gas is being transported to markets instead of being burned at the wellhead. Natural gas is an economic form of fuel and its future markets are well assured; the principal problem is the seasonal nature of demand.

Development of markets constitutes the most serious problem facing the oil producer. In the east, where markets have expanded greatly in the past three or four years and should continue to do so for a number of years to come, the situation is complicated by the competitive pressure of low-cost foreign crude. Ontario refiners, however, have cut imports severely in order to accept more western Canadian crude. The large Montreal market and the Maritimes continue to be served entirely by foreign crudes, and it is to this market that the independent companies look for a solution to their troubles. The second report of the Borden Commission on Energy suggests that some action may be taken by the federal government in order to establish some form of national policy in the oil industry. The type of action contemplated is not disclosed but the suggestion seems to be that import quotas may be imposed on foreign crude and that a Montreal pipeline may be considered. The indication is that the industry will be given until the end of 1960 to work out a solution for itself.

Demand for western Canadian crude oil in eastern Canadian markets,[1/] as well as in United States markets which are accessible to western Canadian crude oils on an economic basis, is expected to increase from the 1958 level of about 240 thousand barrels per day to over 1 million barrels per day by 1975. Even if Montreal refineries did not take domestic crude, the figure would still be in the order of 700 thousand

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1/ Manitoba, Ontario, and Quebec; the assumption is that in the future the government will direct the refining companies in Montreal to use Canadian crude oil. This at the time appears uneconomic but, having regard to the recommendations of the second Borden report, it is obvious that such a move must be considered quite seriously.

barrels per day. If Saskatchewan were to participate in these markets in 1975 in the same percentage as in 1958 (about 40 percent), and assuming reserves were adequate, the province would need to supply in the order of 250 thousand to 300 thousand barrels per day by 1975. Actually, because of the province's location with respect to these markets there seems to be a reasonable chance of the 40 percent participation continuing, despite the fact that Saskatchewan crudes have to be mixed with Alberta crudes before entering the refineries.

The matter of exporting natural gas is one which will greatly concern the new National Energy Board but one which will pose no problem at all to Saskatchewan. Any gas reserves of commercial size discovered in the province will be produced on the completion of development. The problem in Saskatchewan is inadequacy of provincial natural gas reserves at the present time rather than one of surplus. Accordingly, natural gas is being imported from Alberta fields.

Manufacturing Industries Based on Petroleum and Natural Gas

The province already has sizable oil refineries at Regina, Moose Jaw, and Saskatoon and a number of smaller ones elsewhere in the province. The only additional industry of importance which could be based on oil and gas is petrochemical manufacturing. (This industry together with a pulp and paper mill comprise the two largest gaps remaining in the province's complex of secondary industry.) Saskatchewan has an abundance of raw materials to support a petrochemical plant.

The long-term growth in demand for petrochemicals is assured, but in view of (1) the increased competition currently being met by Canadian chemical producers in Europe from the European industry, and (2) the existing pattern of the industry in the Prairie Provinces, eastern Canada, and the United States Midwest, the establishment of a plant in Saskatchewan appears unlikely in the immediate future. However, with a growing demand for chemicals and plastics in the Prairie Provinces by manufacturing industries, agriculture, and domestic consumers, the long-run prospects for a plant appear reasonable. The most likely development is an ammonia plant oriented to the provincial market, primarily in nitrogen fertilizers. The size of the potential market for Saskatchewan will be limited by transport.

There are two important factors that will govern the potential establishment of a petrochemical plant in Saskatchewan.

1. Recent developments in the Edmonton area, coupled with existing chemical industries in Winnipeg, provide substantial productive capacity to supply the Prairie market.

2. There is a tendency for petrochemical industries to establish at the point of consumption, rather than at the source of raw materials. Examples of this in recent years are a new chemical plant in St. Paul and the Imperial Oil Company's new plant at Sarnia to process refinery by-products specifically for sale to petrochemical industries. This trend has been encouraged by recent improvements in facilities for transporting oil and natural gas by pipeline to eastern Canada, Minneapolis, and other United States midwestern cities.

Coal (Lignite)

Lignite deposits are extensive in southern Saskatchewan. They are found as bedded deposits in the Paleocene Ravenscrag formation of Tertiary age. The deposits extend from the international boundary as far as 50 miles north, and from Oxbow in the east, 300 miles to the west near Eastend and Shaunavon (Figure 32).

Probable minable reserves amount to 3.5 billion tons in the Estevan area; 2.7 billion tons in the Willowbunch-Wood Mountain area in south-central Saskatchewan; and 0.3 billion tons in the Cypress Hills area. However, the caloric value of deposits in western areas is lower than elsewhere and, at the present time, the only producing fields are those near Estevan where the coal is more readily minable.

As has been indicated earlier, the production of coal in Saskatchewan has remained roughly at a level of 2.3 million tons for the past few years. Nevertheless there are indications that production will increase considerably in the next few years, mainly for use in power generation.

The competitive position of Saskatchewan's lignite coal is limited by the caloric content, which is 7,000 Btu per pound compared with 8,900 Btu per pound for Alberta coals. Mining costs are low because the coal is obtained from large-scale strip mines largely by mechanized methods; the present selling price is $2.35 f.o.b. Bienfait. The major production is used as fuel for the Saskatchewan Power Corporation power plant at Estevan and for general fuel use in the area lying between Moose Jaw and Saskatoon in Saskatchewan and Winnipeg, Manitoba.

The Saskatchewan Research Council has investigated the possibility of producing by-products, such as other forms of fuel or chemicals, from the lignite, by use of such processes as hydrogenation, gasification, and carbonization, but the prospects appear poor because of the low coal-tar content.

The possible development of the province's iron ore deposits may open up potential uses of lignite in processing the ore:

1. As a source of carbon for the reduction of iron ore to pig iron.
2. As a source of reducing gas for reduction of ore to sponge iron.
3. As fuel for the agglomeration of taconite concentrates.

In addition to the use of lignite in the ore reduction process, if electric smelting were to be undertaken, additional fuel would be required to increase the generating capacity at Estevan.

Summary of Potential for Fuel Minerals

For the next few years, markets for oil and gas will continue to grow. Saskatchewan must import gas, but crude oil supply is large enough to satisfy any expected demand for many years. At the present time oil production is well below potential and is limited only by demand. The construction of a Montreal pipeline, although primarily intended to assist producers in Alberta, would also serve to bolster Saskatchewan production and might induce companies to seek more oil in the province.

The future of lignite coal is limited to local requirements as the low energy content will allow only limited transportation costs. The amount of coal which the Saskatchewan Power Corporation requires is expected to rise substantially in the next few years but perhaps the most important factor that could increase power--and lignite--needs would be the establishment of a steel industry in the province. Unquestionably this should greatly benefit the coal industry in the southeastern part of the province.

Mineral Resources Development Program

Saskatchewan has a variety of mineral resources, some of which are being produced, while others require further exploration before commercial development becomes feasible. Some of the most significant of the province's mineral resources exist only as possibilities indicated by

geologic surveys. Thus a program of intensive exploration remains the prime prerequisite for an expansion of Saskatchewan's mineral potential. The following suggestions are made with that in view. It should be added that some of the suggestions may reflect existing policy of the Department of Mineral Resources.

Suggestions

Accessibility of mineral resources is an item of the greatest importance in a minerals development program. The road presently under construction between La Ronge and Uranium City is a major step in the direction of providing access to the heart of the Precambrian area. As far as present geological knowledge stands, the road will pass through or close by those areas thought to be most promising from the point of view of mineral development.

Work both on reconnaisance and detailed geologic mapping should be accelerated as much as possible and the detailed results and maps made available to interested parties. Of course some work has been done already in mapping the area of mineral resources, but until recently it was not possible for the province to carry out its part of the program on a significant scale. It is suggested that the federal government be requested to accelerate its reconnaisance geologic mapping in the province. This mapping is conducted by the Geological Survey of Canada and is usually in a scale of one inch to four miles. This will provide an aid to exploration and will assist the province in guiding the more detailed mapping program. A first need is for reconnaissance maps of those areas presently uncharted and the program might be continued to resurvey areas where original surveys have been proved inaccurate.

The following tentative proposal for aerial magnetometric surveys might be considered in consultation with the Geological Survey of Canada: Favorable areas, such as indicated in Figure 31, should be surveyed by use of a skeletal pattern. This would consist of five parallel flight lines spaced at 1/4-mile intervals trending normal to the regional strike of the rock foliation. Similar sets of flight strips would be spaced at 20-mile intervals. For an area 100 X 100 miles, at $15 per linear mile, this would cost $45,000 for the skeletal flight lines. From the results of the five sets of lines, trends of rocks with significant magnetic susceptibility would be established and short fill-in lines could be surveyed to connect the magnetic belts between the original sets. The area could probably be filled in for an additional $55,000, making a total cost of $100,000, or $10 per square mile. Using the conventional method, whereby the entire area is covered by lines spaced 1/4 mile apart, the total area that could be

covered for $100,000 would be less than 67 100-mile lines, or 1,700 square miles. The cost would be approximately $58 per square mile. The much more extensive coverage using the skeletal method would more than compensate for the incomplete fill-in of areas where rocks have low magnetic susceptibility. In nine years the entire Precambrian area could be covered.

It is suggested that the federal and provincial agencies might share the costs of a scheme to develop geophysical knowledge of the Precambrian. This would take the form of airborne magnetic and electromagnectic surveys and might be conducted, in part at least, by the RCAF.

More detailed mapping--at least one inch to one mile--should be the responsibility of the province. This would provide the type of information that is of interest to mining companies and would enable them to concentrate on those areas which earlier surveys have indicated to have the greatest mineral potential. The Department of Mineral Resources of the provincial government has already done some work in this field but until very recently was handicapped by the shortage of qualified personnel. In the summer of 1959 it was able to put six survey parties into the field. By the summer of 1960 the Department of Mineral Resources hopes that it will be possible to send out ten such parties. It is highly desirable that at least this number be placed in the field each season.

The Department of Mineral Resources holds training programs at its Prospector's School every summer and through its Prospectors' Assistance Plan supports certain people who wish to explore rock formations in various parts of the Precambrian. This type of prospecting, although perhaps a little haphazard, provides the department with some useful information. It is important that considerable attention be devoted to the recruitment and proper training of prospectors in order to ensure that those who are sent out are properly qualified. More competent participants might be attracted by providing increased incentives, such as full payment of expenses and, within reason, by greater freedom from control as to choice of area and length of time in the field.

The granting of mineral reservations, like the Kennedy Grubstake in the large area south of Lake Athabaska, is an excellent example of the adaptation of government controls to modern prospecting procedures. Points to be remembered in this connection are that the cost of exploration of large areas is high, and that immediate prospect of high returns to the government for permit and lease privileges should not override the more important consideration that the exploration be well planned and executed. At the same time, regulations should be designed to discourage the holding of large inactive groups of claims.

Numerous examples can be given in which mineral discoveries have been delayed for years, because earlier poorly conceived and incomplete exploration projects gave negative results. In short, reservations should be granted to the highest bidder who can prove competence and who will guarantee to conduct a thorough exploration program according to standards set up by the Mineral Resources Department.

An important objective, now being investigated by the Deputy Minister, is the establishment of legislation that will require the preservation of data, including drill core, accumulated by groups involved in Precambrian exploration. In the past, one group after another has investigated a given area with wasteful repetition of effort, resampling, remapping, and even redrilling a favorable prospect. The coordinated effort being made to set up uniform regulations throughout the dominion, comparable with those governing petroleum exploration data, is commendable, and should be pursued to the mutual benefit of the government and industry. The regulations for this purpose might be designed to put sound information on record, yet not to be so difficult to execute nor so revealing of confidential information as to discourage exploration. This proposal received favorable comment at the annual meeting of AIMME at San Francisco, California, in February 1959.

The geologic mapping program should have the primary objective of providing compositional and structural information for each area investigated. However, it is equally important to build up the gross structural pattern of the province by piecing the individual mapped areas together. This will require careful detailed structural mapping, as well as age determination for all major rock types.

General Considerations

There are distinct differences between the oil and metals industries which influence the formulation of policies effecting mining. A major difference is the much greater relative cost required to develop a mine. In the case of oil, the discovery well is the means of access from which production flows or can be pumped. Each succeeding well is also a producing unit. However, in mining, the discovery hole is a minor part of the large capital cost required for mine development. For this reason, mining companies require more time to get into production. Furthermore, many of the major mining companies, and some of the lesser ones, have been successful in building up sufficient reserves to fulfill their requirements for the next 20 to 30 years. They may continue to explore, but they wish to hold some of the more remote deposits for

future use, perhaps for 10, 20, or even 30 years, depending upon the location, size, and grade of the ore body. In some instances, mining companies have greatly curtailed exploration grograms because of the cost of holding great inventories of metal in the ground.

It can be seen, therefore, that regulations that the provincial government may devise for speeding up mineral development may in some cases backfire. If a company knows that the cost of holding a deposit is excessive, it is loath to explore in that province.

Another important consideration in publicizing the exploration potential of an area is to provide sound information. Mining company representatives are generally keen individuals who will be quick to recognize extravagant claims made with little basis of fact.

Services Required to Expand Mineral Industries

Services required to expand mineral industries have been the subject of study of a special committee of Section IV of the Royal Society of Canada under the chairmanship of Drs. H. C. Gunning, of the University of British Columbia, and J. B. Mawdsley, of the University of Saskatchewan, and composed of distinguished members of the Canadian mineral profession from both the academic and industrial fields. The committee presented a brief to the Ministers of Mines of the Canadian Provinces and the Provincial Cabinets at the conference held in Regina in September 1959. The brief represented careful investigation into the capability of those provincial agencies responsible for the services required to develop and expand the mineral industries in all provinces except those four in the Atlantic region. It was the committee's view that the provincial government should, in addition to their regular administrative functions, ". . . provide for (the) collection, digestion and interpretation of geological data obtained by exploration and producing companies, special geological researches on producing and potential areas and publication of the compiled results."[1/] The investigations showed conclusively that ". . . no provincial agency is adequately staffed and financed to perform all those duties efficiently."[1/]

1/ A brief to the Hon. the Ministers of Mines of the Canadian Provinces and the Provincial Cabinets, Saskatchewan, September 1959.

The committee commended the federal and provincial agencies for the high degree of cooperation existing between them but advised the establishment of a more formal means of communication in order to achieve continuity and unanimity in the formulation of long-term policy.

Again, the committee was pleased to report a high degree of mutual understanding and active cooperation between industrial and governmental agencies but urged the need for even closer cooperation in future large-scale planning of geological services.

The relationship between the oil industry and related governmental agencies was found to be reasonably satisfactory. It was noted that a great deal of information is received under regulatory legislation and is made available for the mutual advantage of government and industry alike. As governmental agencies have increased their qualified staff, working relationships between government and industry personnel have improved. However, there is a long way to go before this relationship will reach the stage desired, particularly in furthering regional basic studies with the use of modern techniques.

Cooperation with the petroleum industry is rendered comparatively easy owing to the size of the majority of companies concerned. This, however, cannot always be said with regard to the metal mining industry. In this field a good deal of exploration is carried out by small companies or individuals without proper technical supervision. The provinces are endeavoring to overcome this difficulty and are meeting with a great degree of cooperation. Most large operating companies keep adequate maps and records and data helpful to the industry as a whole which are made available in articles in trade journals or in government publications. Much information continues to be lost, however, owing to the fact that government agencies have not enough people to assemble and study it. This too, is a situation which should be rectified in the near future as the shortage of geologists becomes less acute.

Legislation in many provinces, including Saskatchewan, requires that data obtained in exploration be filed with a provincial agency if credit against assessment work is requested for any of the projects. In the petroleum industry, the combination of this legislation and the cooperative attitude of the industry has produced fairly good results. The principal difficulty here also is that the agencies are not always adequately staffed to make full and immediate use of the information made available.

In regard to the mining industry, legislation is highly complex and in certain instances unenforceable owing to high cost and lack of

personnel. Insofar as it is possible, close cooperation between industry and adequately staffed provincial agencies is strongly advocated.

Additional geological services are required in other fields apart from the requirements of the mineral industry. The Committee of the Royal Society noted that a proper understanding of geological conditions is a basic necessity for the development of surface and ground water supplies, for the efficient design and construction of highways, the discovery and development of road materials, flood controls, prevention of damaging erosion, and the proper classification and use of land.

These factors all add weight to the argument for more and better geological services in the government agencies. The government of Saskatchewan has come a long way in the provision of these services but there is still a long way to go. If these services can keep pace with the demands of industry, a larger measure of voluntary cooperation between industries and the provincial agencies should be readily forthcoming.

In summary, the recommendations of the special committee of Section IV of the Royal Society can be expressed in the following manner.

1. That geological services adequate to maintain a healthy mineral industry and provide information for efficient development of highways, water supply, and similar projects should be maintained in each province.

2. That total government expenditures on geological services in Canada should approximate 1 percent of the value of mineral production. The federal government spends about one-fifth of this and may increase the proportion. The provincial governments, with their more direct responsibility, should spend the remainder, adjusted to long-term needs, trends in mineral production, and local needs.

3. That coordination of provincial and federal services be facilitated by some formal means of communication and long-term planning. The committee believes that, for a start at least, this should be arranged through the Annual Mines Ministers Conference, with opportunity for federal representation.

4. That provincial departments increase their staffs to assure that loss of useful geological information available from industry is reduced to a minimum, and that maximum use of the

information is forthcoming. The committee is convinced that industry is anxious to cooperate with competent provincial scientists. Some readjustments in legislation may be necessary and such changes developed in cooperation with industry.

In addition, Section IV of the Royal Society might be empowered to establish a permanent committee to assist government agencies and industry in attaining adequate cooperative effort.

Operation of the Saskatchewan Department of Mineral Resources

This lengthy discussion of the relationships between government agencies, federal and provincial, and mining and exploration companies provides the basis for the following suggestions which deal with the particular situation facing the Saskatchewan Department of Mineral Resources in the development of Saskatchewan's mineral resources.

1. The Saskatchewan Department of Mineral Resources has built up an enviable organization for the regulation, control, and recording of the activities of the mineral producing companies. At the present time, the geological activity of the department is divided between the Precambrian and Sedimentary sections. Each branch functions reasonably well and there are many individuals in each branch who would like to see a continuation of the status quo. It is suggested, however, that the situation would be improved by integrating the two branches under one head, an administrator who should have a keen appreciation of geologic requirements even though he need not necessarily be a geologist. This would require little adjustment in existing machinery and would lead to better coordination of effort and to better understanding between the two branches. In addition, it might provide easier and quicker access to government service for outside agencies. The actual functioning of the branch would be much the same as it stands at present. It would be responsible for all prospecting and geological activities of the department and for providing and advertising incentives that would encourage exploration.

   Thus, the actual functioning of the branches would not be changed significantly but this sort of organization would improve coordination and perhaps end duplication of effort.

2. Everything else being equal, risk capital will be attracted to areas where profit potentials are greatest. Therefore it will be essential for the Department of Mineral Resources to keep its lease and royalty rates under constant review. This is an extremely important factor and one which will have great significance for Saskatchewan in the future when it is expected mining will again face conditions of undersupply. Saskatchewan could become a most important center of exploration activity, given the right sort of incentives. Every effort should be made to prepare for this situation.

3. The department should consider enlarging its staff of qualified geologists. In addition to the geologists who would be required to conduct the intensified Precambrian mapping program, geologists should also be added to the staff for investigation of the geology of petroleum and natural gas, as well as that of industrial minerals. In particular, more investigation should be made of detailed structure and stratigraphy that would provide additional incentives for oil exploration.

4. The geological division would continue to maintain close contact with the geologists of mining and oil companies, universities, and federal and other provincial surveys. Meetings could be held in Regina to which outside geologists would be invited for discussion of problems of development of the Saskatchewan geologic program. These would stimulate new ideas and a fresh approach to the problems of development of mineral resources.

5. The geological division could have sufficient staff to allow time for more than routine geologic mapping and recording of data. This, rather than controls, might be the prime objective of the group. Projects could be undertaken that will develop fundamental knowledge regarding the geology of the province to provide incentives for mineral exploration.

6. Encouragement might be given to research studies such as that recently undertaken by the Saskatchewan Research Council concerning the hydrodesulfurization of Weyburn crude oil. This study was undertaken by the Research Council at the request of the Department of Mineral Resources and may lead to an important development in the processing of crude oil in the province.

7. A careful analysis of the entire geologic program by capable outside consultants would be desirable. Regardless of their competence, individuals close to the everyday routine of their work sometimes develop prejudices and underestimate the importance of significant bits of information. Experienced consultants or research specialists would be helpful in stimulating new ideas and making the most of all available information.

These are the principal suggestions for the continued advancement of Saskatchewan's mineral development.

Section VI

AGRICULTURAL AND FOREST RESOURCES IN RELATION TO INDUSTRIAL DEVELOPMENT OF SASKATCHEWAN



The Robin Hood Flour Mill in Saskatoon

SASK. GOV'T PHOTO

Section VI

AGRICULTURAL AND FOREST RESOURCES IN RELATION TO INDUSTRIAL DEVELOPMENT OF SASKATCHEWAN

The major renewable resources of Saskatchewan, and the potential for development of industry based upon them, are agriculture and forests. In this section these resources and their industrial potential are reviewed and analyzed. Fish and fur are not dealt with in any detail due to their relatively unimportant role in the over-all provincial economy. However, it is recognized that these two resources are of extreme importance to the inhabitants of the northern region.

Agriculture

Production

Agricultural land is Saskatchewan's most valuable natural resource. As noted in Section III, agriculture is still the major industry in the province (see Figure 2) and is likely to remain so for some time to come. Historically, it has been a raw material exporting industry, although a number of important manufacturing industries in the province are dependent upon it, especially flour milling and meat packing. Tables 69 through 73 show historical trends in Saskatchewan's agricultural production.

The Pattern of Agriculture

The pattern of agriculture in Saskatchewan at present is shown in Figure 33. Saskatchewan's agriculture has undergone considerable changes since 1930 (refer to Section III), and many changes are still in process. These changes will affect the future pattern of both agricultural output and input, and will doubtlessly be of significance to other industries, both present and potential, in the province.

Five main factors are likely to influence the future pattern of agriculture in Saskatchewan: the number of farms, diversification, technology, irrigation, and land development.

Table 69

FARM CASH INCOME IN SASKATCHEWAN
1938-1958
(Millions of Dollars)

Year	Wheat	Coarse Grains and Flax	Livestock	Poultry and Eggs	Dairy Products	Miscel-laneous Products	Cash Income from Farm Products	Supple-mentary Payments	Total Cash Income
1938	$ 64	$ 3	$ 11	$ 4	$ 7	$ 4	$ 93	$--	$ 93
1939	120	7	15	5	6	4	157	2	159
1940	101	7	24	5	7	6	150	7	157
1941	89	12	37	6	11	5	160	18	178
1942	75	35	54	11	16	7	198	33	231
1943	122	86	73	13	20	8	322	18	340
1944	306	84	95	17	22	10	534	12	546
1945	201	77	82	16	19	11	406	3	409
1946	211	59	74	14	20	11	389	12	401
1947	229	87	66	13	23	13	431	10	441
1948	307	66	103	16	27	15	534	17	551
1949	365	57	94	11	23	15	565	14	579
1950	232	39	103	9	20	11	414	8	422
1951	419	53	114	17	23	13	639	5	644
1952	483	97	80	16	22	15	713	3	716
1953	521	85	80	19	23	17	745	1	746
1954	270	68	79	18	23	12	470	1	471
1955	225	65	83	20	24	10	427	22	449
1956	340	114	85	21	24	14	598	1	599
1957	298	79	103	21	26	12	539	1	540
1958[1/]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	563	32	595

1/ Preliminary.

Source: Saskatchewan Economic Review, Economic Advisory and Planning Board, Government of Saskatchewan, April 1959.

Table 70

ACREAGE AND PRODUCTION OF PRINCIPAL FIELD CROPS
IN SASKATCHEWAN
1943-1958

Harvest Year	Wheat	Oats	Barley	Rye	Flax
	Acreage (thousands of acres)				
1943	9,622	6,120	3,316	295	2,200
1944	13,200	5,194	2,698	398	890
1945	13,610	5,073	2,555	259	550
1946	14,226	4,331	2,318	407	480
1947	14,226	3,983	2,780	756	850
1948	14,389	3,652	2,316	1,470	630
1949	15,737	3,381	1,800	724	122
1950	16,500	3,381	1,954	685	170
1951	15,635	3,815	2,449	710	296
1952	16,600	3,362	2,644	742	360
1953	16,800	2,721	2,745	870	324
1954	16,600	2,851	2,313	451	489
1955	14,100	3,654	3,846	457	1,030
1956	14,569	3,670	3,027	300	1,710
1957	13,365	3,214	3,791	268	2,025
1958	13,182	3,064	3,939	248	1,496
	Production (thousands of bushels)				
1943	146,000	189,000	80,000	3,300	12,800
1944	242,100	183,000	72,000	4,800	6,050
1945	168,100	127,000	52,100	2,620	3,200
1946	208,000	100,000	43,000	4,005	2,900
1947	173,000	80,000	45,000	7,300	5,100
1948	191,000	89,000	42,000	12,525	5,000
1949	186,000	85,000	33,000	4,750	600
1950	272,000	112,000	46,000	6,500	950
1951	325,000	148,000	73,000	9,800	2,300
1952	449,000	152,000	92,000	14,200	3,900
1953	391,000	111,000	82,000	15,300	3,300
1954	169,300	86,000	53,000	6,600	4,500
1955	320,000	135,000	104,000	8,250	11,300
1956	355,000	165,000	99,000	4,000	19,500
1957	211,000	80,000	80,000	3,200	10,500
1958 1/	192,000	83,000	87,000	2,500	11,300

1/ Preliminary.

Source: Saskatchewan Economic Review, Economic Advisory and Planning Board, Government of Saskatchewan, April 1959.

Table 71

VALUE OF PRINCIPAL FIELD CROPS
IN SASKATCHEWAN
1943-1957
(Thousands of Dollars)

Harvest Year	Wheat	Oats	Barley	Other	Total
1943	$166,440	$107,730	$52,000	$40,760	$366,930
1944	302,625	95,160	54,000	29,335	481,120
1945	275,684	63,500	33,865	22,254	395,303
1946	336,960	55,000	33,110	28,736	453,806
1947	281,990	63,200	49,950	63,806	458,946
1948	311,330	56,070	39,900	49,967	457,267
1949	299,460	62,900	42,240	20,290	424,890
1950	405,280	77,280	50,600	27,698	560,858
1951	494,000	100,640	78,840	43,265	716,745
1952	713,910	89,680	93,840	50,863	948,293
1953	520,030	62,160	68,060	35,682	685,932
1954	204,853	51,600	45,580	34,961	336,994
1955	441,600	82,350	89,440	59,636	673,026
1956	440,200	80,850	77,220	71,344	669,614
1957	272,190 1/	42,400	60,800	56,156	431,546

1/ Based on an estimated final price of $1.29 per bushel.

Source: Saskatchewan Economic Review, Economic Advisory and Planning Board, Government of Saskatchewan, April 1959.

Table 72

LIVESTOCK POPULATION AND MARKETINGS
IN SASKATCHEWAN
1943-1958
(Thousands)

Year[1/]	Population				Marketings				
	Cattle	Calves	Sheep and Lambs	Hogs	Year[1/]	Cattle	Calves	Sheep and Lambs	Hogs
1943	1,140	462	463	1,755	1943	269	64	104	1,409
1944	1,395	528	531	1,599	1944	379	82	136	1,934
1945	1,436	543	513	1,007	1945	495	111	161	943
1946	1,074	425	335	523	1946	481	102	142	514
1947	1,067	444	285	558	1947	370	83	101	435
1948	1,026	411	253	396	1948	465	108	78	357
1949	893	361	234	459	1949	415	103	56	280
1950	1,631	354	237	434	1950	372	99	50	279
1951	919	356	136	533	1951	305	71	41	328
1952	997	385	155	646	1952	262	55	46	535
1953	1,025	410	170	469	1953	370	91	47	420
1954	984	403	156	539	1954	416	104	45	421
1955	1,034	416	159	715	1955	399	97	47	562
1956	1,315	554	143	592	1956	440	105	42	577
1957	1,354	566	154	633	1957	561	123	45	535
1958	1,270	590	175	890	1958	574	161	45	705

1/ As of June 1.

Source: Saskatchewan Economic Review, Economic Advisory and Planning Board, Government of Saskatchewan, April 1959.

Table 73

POULTRY POPULATION AND EGG PRODUCTION
IN SASKATCHEWAN
1943-1958

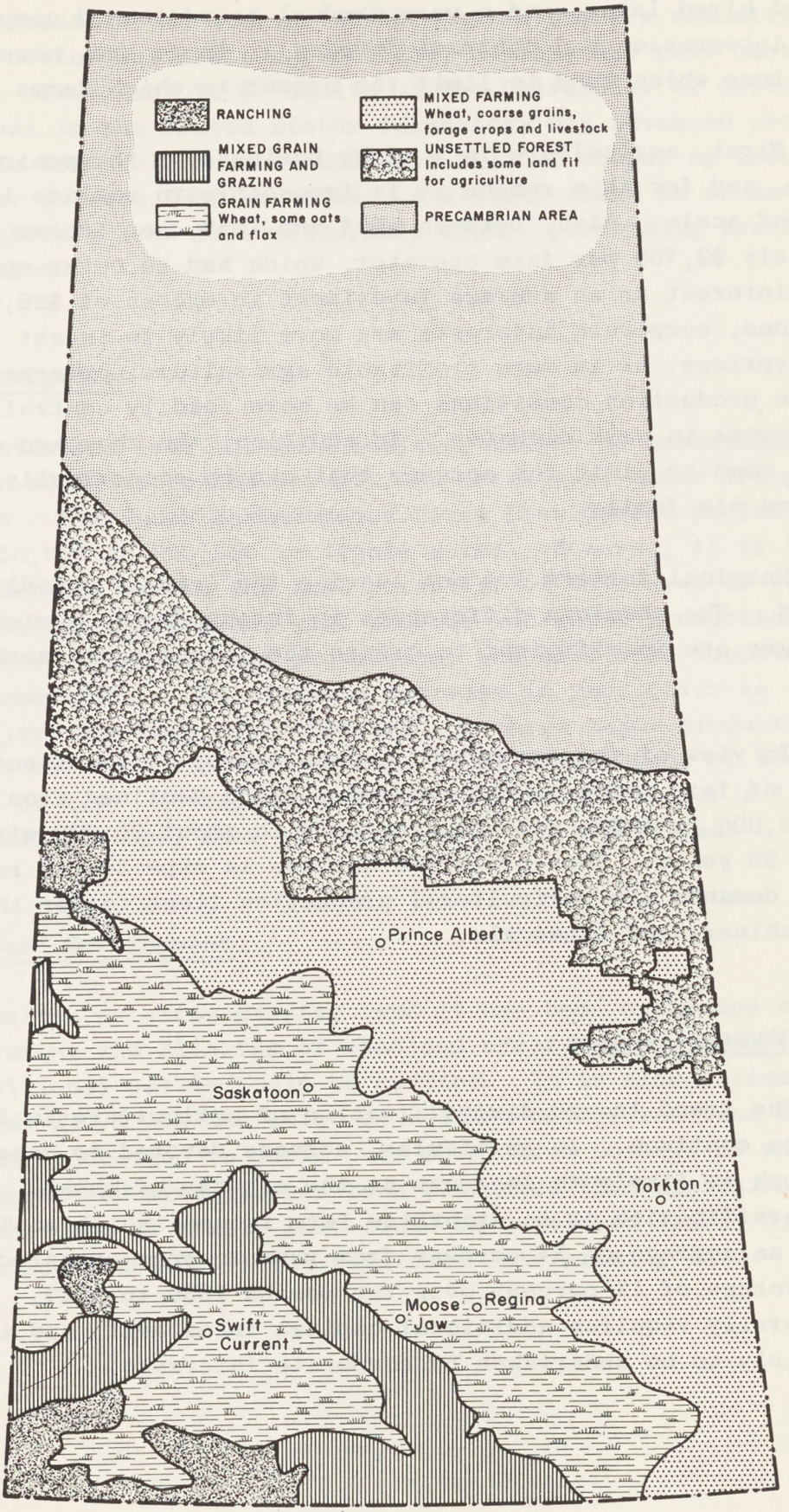
Year	Poultry[1/] (thousands)			Egg Production (thousand doz)
	Hens and Chickens	Other	Total	
1943	11,457	977	12,434	57,264
1944	13,902	1,319	15,221	70,583
1945	12,248	1,163	13,411	64,634
1946	10,599	733	11,332	37,030
1947	12,780	754	13,534	40,656
1948	9,590	372	9,962	37,825
1949	9,043	479	9,522	33,431
1950	8,104	347	8,451	29,769
1951	8,587	485	9,072	28,301
1952	8,587	704	9,291	32,606
1953	7,728	578	8,306	32,517
1954	7,642	704	8,346	32,804
1955	7,900	755	8,655	37,481
1956	8,525	841	9,366	38,577
1957	8,100	1,015	9,115	42,617
1958	8,300	1,265	9,565	43,903

1/ As of June 1.

Source: Saskatchewan Economic Review, Economic Advisory and Planning Board, Government of Saskatchewan, April 1959.

FIG. 33

MAIN TYPES OF FARMING IN SASKATCHEWAN



Number of Farms

The number of farms has declined as a result of mechanization, shortage of hired labor, and a very gradual trend toward corporate farms (vertical integration and contract farming). There are, however, a number of factors which tend to limit the extent to which farms will grow.

First, agriculture is a risky business on the prairies because of weather, and for this reason it is impossible to realize in full the economies of scale. Also, between 1954 and 1958, net income averaged approximately $2,700 per farm operator, which had to cover operator's labor and interest on an average investment in excess of $26,000. For these reasons, corporate interests are more likely to invest in industrial enterprises, or in more profitable agricultural enterprises in areas where production conditions can be more readily controlled such as irrigated crops in warm climates. In addition, the shortage of hired labor will tend to limit the acreage that can be economically handled by a farmer and his family.

Marginal farmers are not leaving the land as rapidly as might be expected. The absolute differences in income due to agricultural price changes are insufficient to create the incentive to seek a living in town.

In view of the factors discussed above, it is expected that the number of farm units in the province, which declined from 126,800 in 1941 to 100,000 in 1958, will decline only to about 70,000 within the next 20 to 30 years. This projected decline is expected to result in increasing demands for agricultural production items (other than labor) such as machinery and chemicals.

Diversification

The trend toward diversification of agriculture in Saskatchewan is likely to continue. In particular, acreage devoted to coarse grains and livestock is likely to increase at the expense of wheat. The major aim of diversification is to stabilize farm income, which in Saskatchewan has varied an average of 24 percent from year to year compared with the Canadian average of 12 percent over the period 1930 to 1957. Diversification generally requires additional capital investment, and therefore is most likely to be undertaken by corporate interests.

Technology

It has been estimated that grain production in Saskatchewan could be increased by an average of 95 million bushels annually through adoption of better cultivation practices, disease and pest control, and fertilizing. Professor T. W. Shultz of the University of Chicago has estimated that in the United States technology has advanced productive efficiency in terms of reduced input per unit of output by about 2.5 percent per year between 1926 and 1954. A similar trend in Saskatchewan should undoubtedly lead to considerably higher purchasing power of the farm population.

Irrigation

Water has been the main limiting factor in Saskatchewan agriculture. In 1958, approximately 200,000 acres were under irrigation in the province. The South Saskatchewan River Development project has an estimated 450,000 to 500,000 irrigable acres. However, it is likely to be several decades before the full potential of this area is realized. Thus, the initial development will provide increased production of hay as a basis for expanding beef production, and also will support some vegetable production. The ultimate increase in production as a result of this project has been estimated for the three major products at approximately 1-3/4 million bushels of grain, 75 million pounds of beef, and 60,000 tons of hay. In addition, there is a potential for a limited number of specialty crops, such as sugar beets and vegetables.

Land Development

On the existing grazing land it has been estimated that by pasture improvement and clearing of woodland areas, approximately 3/4 of a million additional cattle could be carried. It is also estimated that an additional 2-1/2 million acres of settled unimproved land could be brought into production to yield over 30 million bushels of wheat annually. In unsettled areas it has been estimated that approximately 3/4 of a million acres of arable land could be developed mainly by drainage, and an additional 800,000 acres developed into grazing land.

Implications of the Future Pattern of Agriculture

These potential changes in agriculture are of importance to the industrial development of the province for the following reasons:

1. Improved efficiency and the resulting increase in per capita income of the farm population will result in higher total purchasing power in spite of reduced numbers, and will therefore provide a basis for a larger Saskatchewan market.

2. To effect the production and development outlined above will require large capital expenditures by farmers, cooperatives, corporate interests, or government agencies on items such as implements, fertilizers, and buildings.

3. Expansion and diversification of farm products may displace some Saskatchewan imports, such as potatoes and a limited number of other vegetables, thus making the province more self-sufficient at lower cost.

4. Development of new industries or expansion of existing industries may take place in the processing of food, fiber, and hides. Such enterprises include vegetable canning or freezing, meat packing, and leather tanning.

Agriculture-Based Industries

In analyzing opportunities for industries that use agricultural products as raw materials, such industries may be classified as follows:

Food processing
Fiber processing
Hide processing (leather tanning)
Chemicals, oils, and related products

Agriculture-based industries are already well established in the Prairie Provinces (see Table 74). Any expansion in this field is governed by (1) the over-all development of the Prairie, Canadian, and overseas markets, (2) the development of crops and livestock to allow production of new items, and (3) changes in technology leading to the manufacture of new products from the same agricultural raw materials. Table 75 shows the major movements of agricultural products in the Prairie Provinces and indicates those items where additional processing may be possible before exporting. (See Appendix A, Table 92.)

Table 74

AGRICULTURE-BASED MANUFACTURING INDUSTRIES
IN THE PRAIRIE PROVINCES
1957

Industries	Number of Manufacturing Establishments			Total Employees			Value Added by Manufacture (dollars)		
	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan
Slaughtering and Meat Packing and Processing	16	21	9	4,001	3,220	1,297[1/]	$25,380,009	$26,737,567	$10,685,273[1/]
Flour Mills	10	8	9	663	509	759	5,112,672	2,660,334	7,041,149
Butter, Cheese, and Dairy Products	100	68	57	2,066	1,237[1/]	1,330	10,527,138	6,632,288[1/]	7,685,417
Canning and Processing	7	9	1	337	170	14[1/]	1,956,369	697,213	97,013
Total	133	106	76	7,067	5,136[1/]	3,400[1/]	$ 42,976,188	$36,727,402[1/]	$25,508,852[1/]

1/ Figures include estimates of employees and value added when respective industry figures were combined to prevent disclosure of confidential information in those cases where only one firm was operating in a province.

Source: The Manufacturing Industries of Canada, 1957, D.B.S., Industry and Merchandising Division, Vol. 2, Part II, Section E, Prairie Provinces, pp. 12, 25, 34.

Table 75

NET EXPORTS OF AGRICULTURAL PRODUCTS
FROM THE PRAIRIE PROVINCES
1957
(Tons)

Commodity	Manitoba	Alberta	Saskatchewan
Wheat	129,802	2,839,043	6,050,283
Oats	401,239	244,170	449,911
Barley	317,388	816,158	999,674
Flaxseed	152,102	167,599	446,871
Other Grains	26,664	25,866	85,393
Flour	115,568	152,902	238,630
Other Mill Products	117,504	117,354	217,725
Fruits and Vegetables, Fresh and Processed	—	--	533
Other Agricultural Products	98,116	88,785	174,075
Cattle and Calves	62,950	131,448	144,389
Hogs		42,350	20,443
Dressed Poultry	1,337	2,213	3,818
Dressed Meats, Cooked, Cured and Salted, Smoked	65,425	71,879	10,519
Other Packing House Products, Edible	20,791	15,781	--
Eggs	--	1,070	3,182
Butter	3,686	--	6,617
Hides and Leather	7,610	10,252	3,792
Other Animals and Products	--	9,855	5,876
Total	1,520,182	4,736,725	8,861,731

Source: Railway Freight Traffic, year ending December 31, 1957, pp. 50, 56, 62.

Food Processing

Table 74 shows the food-processing industries operating in the Prairie Provinces in 1957. Industries processing small grains--wheat, oats, rye, and barley--are well developed in Saskatchewan, and opportunities for large-scale expansion appear limited in view of the nature of the specific industries involved. In the flour industry, the tendency is for importing areas, particularly overseas countries, to import wheat and to produce the major portion of flour requirements at the point of consumption. Thus, milling capacity has become concentrated not where the wheat is raised, but close to large population centers. In addition, the trend in per capita consumption of flour indicates that any significant expansion of milling facilities in Saskatchewan is unlikely in the near future. There is likely to be an increased local demand for flour, as population increases, by industries producing such items as macaroni, spaghetti, breakfast foods, semolina, bread, and bakery products.

The major utilization of barley is in the malt industry. Per capita consumption of barley for food purposes other than malt has declined to about one-third of consumption in the 1920's. However, the upward trend in malt beverage production provides a firm basic demand for barley for malting purposes. Opportunities for expansion of the Saskatchewan malting industry are related to the growth in provincial population and income.

Per capita consumption of rye flour has shown a steady decline, and in view of this and the lack of alternative uses, this grain appears to offer little potential in Saskatchewan as an industrial raw material.

Potatoes appear to offer good possibilities for expanded processing in Saskatchewan. The province has potential capacity to supply its own requirements of raw potatoes, although in 1957 over 7,000 tons were brought into the province. Besides being sold raw, potatoes may be sold in several other forms: dehydrated, canned, chips, and cooked frozen forms. Industries utilizing potatoes for processing the above-mentioned products could be relatively small. Their market would probably be restricted to the province.

With large-scale development of irrigation in the South Saskatchewan River scheme, it would be possible to grow sufficient sugar beets in a relatively compact area (necessary to reduce transport costs) to supply a sugar refinery. The province is now supplied by two refineries, one in Manitoba and one in Alberta. Both of these can supply certain parts of Saskatchewan as cheaply as could a local plant, and they have adequate capacity. The existence of these two plants is likely to

delay any Saskatchewan development until there is a substantial increase in consumption in the Prairie Provinces, particularly in Saskatchewan, which would warrant a third plant.

Canning, freezing, and dehydration of vegetables and small fruits are all food-processing possibilities in those areas that can grow a sufficient surplus over and above the fresh demand to support a plant. With the potential irrigated area in the South Saskatchewan River project, moisture conditions will no longer be a factor limiting the growing of fruits and vegetables for commercial processing. The major limiting factor will then be the short growing season, which severely restricts the variety of products that could be handled. This situation would mean that the operation of such plants would be highly seasonal, relative to plants operating in such areas as southern Ontario, British Columbia, or California. In view of the competition provided by these areas and by suppliers already operating in neighboring Prairie Provinces, as well as the fact that there is only limited acreage of irrigated land in the province at the present time, it appears unlikely that there will be any significant developments in this form of food processing for some time. A possible exception is the development of vegetable freezing to supply the Saskatchewan market initially, with possible expansion to the other Prairie Provinces. The Saskatchewan Research Council has been conducting research during the past two years to ascertain whether certain varieties of Saskatchewan-grown vegetables are suitable for freezing. The vegetables under study are two varieties of broccoli, three of beans, four of peas, and five of corn. Freight on frozen foods is extremely high, giving a local producer considerable advantage which can be applied against the higher cost of small-scale and highly seasonal operation.

The slaughtering and meat packing industry is one of the most important in the province; in 1957 it accounted for over 10 percent of the gross value of manufactured products. The meat industry in North America is assured of long-term growth. The two major problems associated with meat are the production cycle, which has led to wide price fluctuations, and the perishability of the product, which has further contributed to this price instability. A further unsettling feature from the point of view of the Saskatchewan producer has been the variation in imports by the United States; this gives little encouragement to the idea that there will be an assured United States market. However, in spite of these factors, the outlook is for expanded production and processing of beef, pork, mutton, and lamb in Saskatchewan. In addition to expanded physical output, more facilities will probably be required to supply the increasing market for packaged and precooked meat and meat products.

Although the production of prepared stock and poultry feeds is not strictly a food-processing industry, this industry is a likely candidate for expansion in the province, in view of the long-range outlook for increased cattle production. The opportunities in this industry were the subject of a study by the Saskatchewan Government Industrial Development Office.

With expanded irrigation there is also the possibility of expansion in industries processing dairy products. Studies have been conducted by the Industrial Development Office to appraise the possibilities of processed milk products--condensed, evaporated, and powdered milk. The development of herds of sufficient size in a limited area to supply dairy products plants on the newly irrigated areas is likely to be a slow process and would be limited by the size of the provincial market, as it is not expected that processed milk products would be readily sold in either of the other two Prairie Provinces. There are possibilities for expansion in production of other dairy products, the most notable being processed cheese, 1,000 tons of which were imported into the province in 1957. (See Appendix A, Tables 92 and 93.)

Fiber Processing

The only fiber processing that could be undertaken would utilize wool.[1/] In the case of a woolen mill, there are a number of factors which indicate that such a development is unlikely at the present time: (1) a tendency in the woolen industry to concentrate mills in areas with relatively humid climates, such as Leeds, Boston, and Portland; (2) the currently world-wide excess capacity in the industry; and (3) the decline in the woolen goods market relative to competing fibers (although this market is being maintained in absolute terms).

Over the past 10 years Saskatchewan's production of greasy wool has averaged between 600,000 and 700,000 pounds annually, mostly of the worsted variety. The opportunity for establishing a wool-scouring plant has been studied by the Industrial Development Office. Scouring wool eliminates the dirt and grease, which account for approximately half the weight of unscoured wool. Scouring at a plant in or near the producing area before shipment might thus be expected to provide substantial savings in transportation costs.

1/ Linen flax is not well suited to production in Saskatchewan.

However, the practice of the worsted mills is to purchase wools "in the grease" (unscoured) and blend them prior to scouring, as this results in a better blend. In obtaining the wool, the buyer personally makes a selection at a warehouse. The warehouses and major weaving mills are located in eastern Canada. Obviously operation of a scouring plant in Saskatchewan would conflict with these established practices.

Leather Tanning and Leather Goods

There has been considerable interest in establishing a tanning industry in the province in recent years; in 1957, 3,800 tons of hides were exported. Tanning chemicals are readily transportable and are therefore relatively unimportant in the location of tanneries. Rather, access to the supply of a variety of hides is a dominant factor. The principal advantage in locating a tannery close to the source of green hides and skins arises because a loss in weight occurs in the tanning process. The Industrial Development Office has made a study of tanning opportunities in the province. Because of competitive factors it is likely that such an enterprise would be relatively small.

The presence of a tannery could provide a stimulus to the location of associated manufacturing enterprises. Leather products manufacturing plants range from factories of substantial size to small shops operated in the spare time of a local craftsman. Since it is possible to enter this business on a small scale, the creative craftsman can test his ability and gain experience in a small market area with a nominal investment. If successful on this scale the business could be enlarged, as experience and available capital would indicate.

A great variety of leather goods are manufactured by many hundreds of firms. Geographically, these firms are most numerous in large cities in eastern Canada, the eastern United States, and on the West Coast. However, many firms are in small cities scattered throughout Canada. To attract any significant amount of leather goods manufacturing, a tannery would need to process a variety of skins and hides.

Many leather products are either novelties or fashion accessories in the women's wear field. Constant revision of design and close touch with the market are essential to success with such products, which puts a premium on locating the plant in a major market center. For this reason a Saskatchewan producer would do well to avoid fashion and novelty items and concentrate on articles that would become staples of a design for which continuous contact with the fashion centers is not required. A western style or motif could provide the basis for such enduring designs.

It may be possible ultimately to popularize a "made in Saskatchewan" label as indicative of high quality and desirable style in certain leather items.

Chemicals, Oils, and Related Industrial Products

The surpluses of agricultural products which have accumulated in both Canada and the United States since the end of World War II have led to considerable pressure for research to develop industrial uses for agricultural products and to develop new crops specifically for industrial uses. Both the Prairie Regional Laboratory of the National Research Council at Saskatoon, and the Saskatchewan Research Council in Saskatoon have been active in this field. One of the first studies of this nature applying to the province's agricultural products is contained in the report by the Saskatchewan Reconstruction Council.[1/]

Wheat is the major agricultural crop in Saskatchewan and is also the major surplus item in Canada. Therefore, it is appropriate that research workers have given this crop considerable attention directed toward industrial utilization. Any industry utilizing wheat to produce an item with low unit weight or volume relative to the amount of wheat required for production of a unit would tend to locate in the middle of a large source of supply of wheat to minimize freight costs. The major industrial possibilities for utilizing wheat are:

1. The manufacture of insulating board and hardboard from wheat straw. A plant opened in Saskatoon in 1958 to process wheat straw for this purpose.

2. The production of starch and gluten from wheat flour. Canada imports approximately 10,000 tons of cornstarch annually. If an economical process can be obtained for separating gums from the starch and refining the starch to lower nitrogen levels in the production of starch from wheat, a substantial industry could be developed in the Prairie Provinces. The most logical location for such a plant would be Saskatchewan, which has the largest and most concentrated sources of raw material. The development of the starch industry need not be predicated on its

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1/ Report of the Saskatchewan Reconstruction Council, Appendix 5, "Industrial Utilization of Farm Products in Saskatchewan," August 1944.

products being competitive with imported goods in eastern markets. It is entirely possible, in fact likely, that an efficient plant would receive adequate tariff protection from foreign competition.

3. Alcohol manufacture. The production of fermentation alcohol from wheat has been tried in both the United States and Canada, particularly during World War II. To date no process has been developed that will allow production at a cost competitive with that of petroleum alcohol. The cost differential is 10 to 20 percent. Alcohol is primarily used in the chemical industry, in the manufacture of various organic acids, plastics, weed killers, solvents, etc. The long-term outlook is for substantial growth in consumption of alcohol, but at present there is no indication that the demand cannot be met from petroleum sources. A possibility for expanded consumption lies in federal action by the United States or Canadian governments to require addition of alcohol to gasoline. Such action would be a result of a desire to increase utilization of surplus farm products. In this case, the production of industrial alcohol through fermentation of wheat in Saskatchewan would offer distinct possibilities.

   The best possibility in Saskatchewan is for the use of alcohol in distilled liquors. A distillery is currently planned for Saskatoon. A substantial market could be found in the United States for Canadian liquors, if authorities would release the higher grade products for export.

The only other agricultural products grown in Saskatchewan which are suitable for industrial utilization are rapeseed and flaxseed, both of which form the raw materials for vegetable oils.

The possibility of utilizing rapeseed in the manufacture of margarine in this province has been considered, since nine million pounds of margarine are consumed annually, all imported from the eastern provinces or the United States. The increasing per capita consumption of margarine would further indicate the feasibility of a margarine manufacturing plant.

The Saskatchewan Research Council is carrying out an extensive study of the utilization of rapeseed for the manufacture of lubricants. Should a satisfactory process be developed, it undoubtedly would provide a good industrial prospect for the province, as lubricants are assured

of long-term growth, and a substantial market already exists in Saskatchewan and the other Prairie Provinces.

A linseed oil mill is already operating in Saskatchewan; it is well located for raw materials, and further, the province's expanding livestock industry utilizes much of the linseed cake and meal by-products. However, in terms of expansion, there are a number of limiting factors. A plant in Saskatchewan would not be well situated to supply the large Ontario and Quebec markets. The market for linseed oil is governed by the paint industry which has, to a considerable extent, switched production from oil-based paints to water-based alkyd paints. Even in the oil-based paints, linseed oil is meeting increased competition from soybean oil. In the United States consumption of linseed oil has shown a steady decline of 27 percent over the period 1948-58, while over the same period soybean oil has shown a slight increase. Synthetics also pose a threat. In view of recent trends in the paint industry and the lack of significant alternative uses for linseed oil, the expansion of the linseed oil industry seems unlikely.

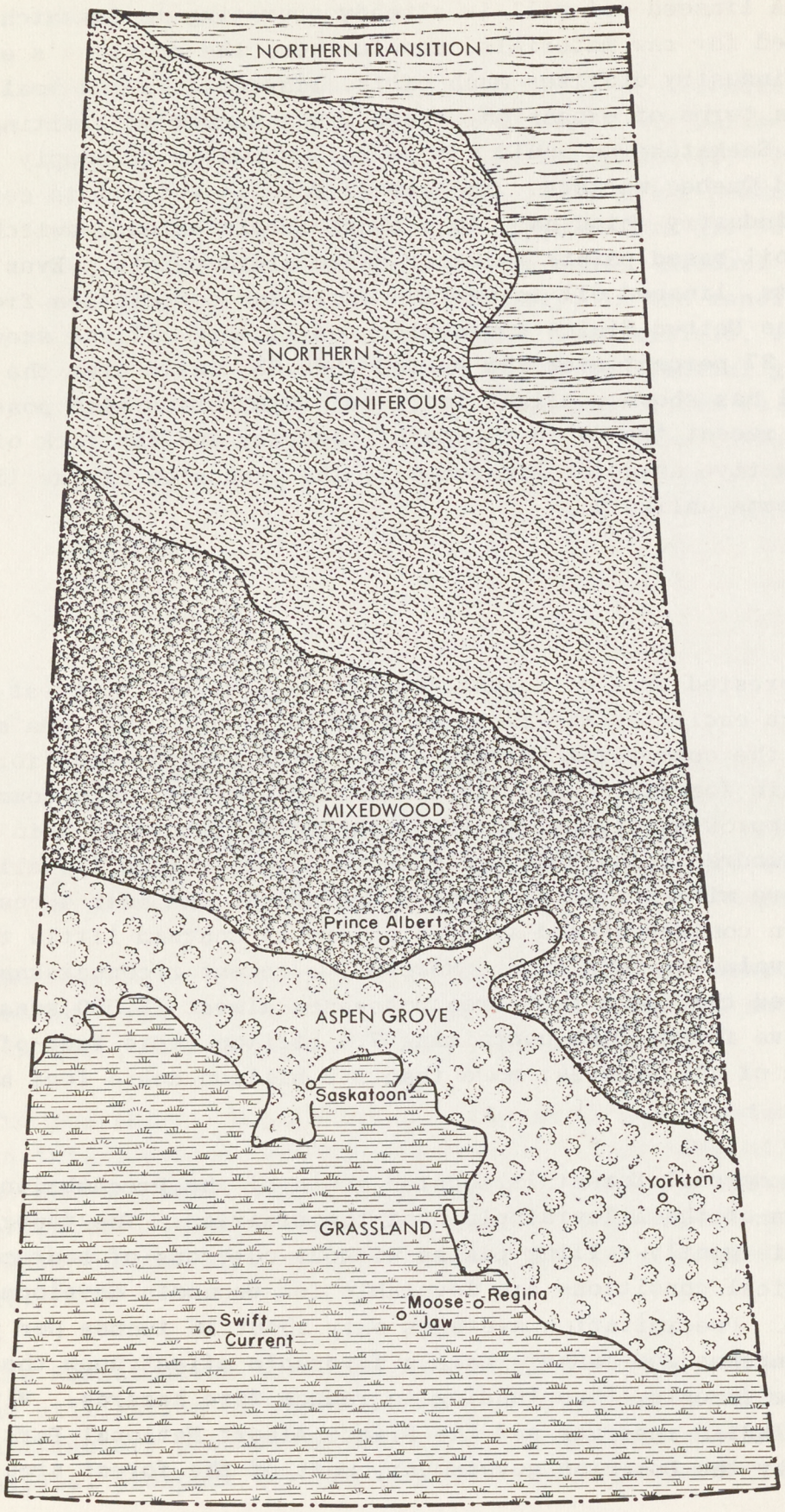
Forests

The forested area of Saskatchewan is a part of the great coniferous forest which encircles the globe at this latitude. The area may be divided into the commercial forests, the northern coniferous forests, and the subarctic forests; these are shown in Figure 34. The commercial zone comprises approximately one-third of the total forest area in a belt averaging one hundred miles wide along the southern margin (totaling about 38,000 square miles). It contains the heaviest and most accessible stands. The northern coniferous and subarctic forests contain little timber of commercial value at this time. However, a recent reconnaissance survey has indicated that even this area possesses almost 12,000 square miles of productive forest land containing 7.4 billion cubic feet of merchantable timber of all species; more than 3.3 billion cubic feet are valuable softwoods.

The commercial forest is located south of the Precambrian shield on an extension of the alluvial plain of the prairies. The topography, therefore, is gently rolling plains without outcrops of bedrock. Accordingly, physical conditions are favorable for economic development of the forest area. Precipitation averages only about 16 inches per year; however, the marshes and muskegs have a favorable effect upon the humidity level in the forests, thus tending to reduce fire hazards. With the exception of Indian reserves and the Prince Albert National Park, which are controlled by the Dominion government, most of the forest area of

FIG. 34

FOREST ZONES OF SASKATCHEWAN



Saskatchewan is Crown land under the jurisdiction of the Province of Saskatchewan. An additional 3 million acres of forest lands, in the form of farm wood lots are privately owned. The Department of Natural Resources has an active cooperative program with farmers to promote forest management practices on private wood lots.

Volume and Utilization

Saskatchewan's accessible forest has been classified as follows:

	Millions of Acres	Percent
Productive	12.0	50.0%
Nonproductive	7.9	33.0
Nonforested	1.4	5.6
Water	2.8	11.4
Total	24.1	100.0%

The makeup of the hardwood and softwood volumes by species and allowable annual cut is shown in Tables 76 and 77.

Analysis of the timber inventory shows that slightly more than half the total area surveyed may be classed as productive forests. In this area, softwood cover-types predominate over other forest types, occupying 3.7 million acres, or 30.8 percent of the total forested area. Hardwood cover-types occupy 3.6 million acres, or 30.0 percent. Mixed wood stands occupy 3.2 million acres, or 26.7 percent. A very small portion, 134,000 acres or 1.1 percent of this area, is recently cut-over land; 1.3 million acres, or approximately 11 percent, are classed as productive nonforested--mainly burnt-over land.

This productive forest area has been divided into four classes of stands: reproduction, small poles, large poles, and sawtimber. Within this area, approximately 25 percent is in the reproduction class, 40 percent in small poles, 25 percent in large poles, and only 0.5 percent in mature sawtimber stands. The remaining 9.5 percent is unclassified. This means that for the coming 20 years all sawtimber produced will come from relatively small areas. After 20 years, it should be possible to double or triple production.

Table 76

CUBIC FOOT VOLUME OF TIMBER BY SPECIES AND ADMINISTRATIVE REGION
IN SASKATCHEWAN
1958
(Thousands of Cubic Feet)

Species	Accessible Areas						Potentially Accessible Area (Northern Region)	Grand Total Provincial Forests	Species as Percent of Total
	Prince Albert	Meadow Lake	Hudson Bay	Northern	All Areas	As Percent of Total			
Softwoods									
White Spruce	372,102	204,259	515,965	304,402	1,396,728	14.20%	219,398	1,616,126	11.10%
Black Spruce	819,033	78,772	232,099	511,400	1,641,304	16.70	1,897,053	3,538,357	24.32
Jack Pine	830,073	319,643	18,408	568,964	1,737,088	17.67	1,090,621	2,827,709	19.43
Balsam Fir	71,449	13,185	33,557	35,618	153,809	1.56	25,578	179,387	1.23
Tamarack	45,513	21,072	8,600	28,310	103,495	1.05	100,930	204,425	1.41
Subtotal	2,138,170	636,931	808,629	1,448,694	5,032,424	51.18%	3,333,580	8,366,004	57.49%
Hardwoods									
White Poplar	839,107	866,964	1,254,485	559,557	3,520,113	35.81	987,289	4,507,402	30.97
Black Poplar	124,107	130,058	489,717	122,205	866,087	8.81	2,158	868,245	5.97
White Birch	122,578	61,013	92,670	101,675	377,936	3.85	398,082	776,018	5.33
Elm	7,843	—	—	10,739	18,582	0.18	—	18,582	0.13
Manitoba Maple	5,849	—	—	9,010	14,859	0.16	—	14,859	0.10
Green Ash	496	—	—	430	926	0.01	—	926	0.01
Subtotal	1,099,980	1,058,035	1,836,872	803,616	4,798,503	48.82%	1,387,529	6,186,032	42.51%
Total	3,238,150	1,694,966	2,645,501	2,252,310	9,830,927	100.00%	4,721,109	14,552,036	100.00%

Source: Saskatchewan Department of Natural Resources, Forestry Branch.

Table 77

ALLOWABLE AND ACTUAL ANNUAL CUT
IN SASKATCHEWAN FORESTS

Species	Allowable[1]			Actual[2]		
	Saw-timber (millions of board feet)	Cord-wood (thou-sands of cords)	Total (thou-sands of cubic feet)	Saw-timber (millions of board feet)	Cord-wood (thou-sands of cords)	Total (thou-sands of cubic feet)
Softwoods						
White Spruce	45	--	9,000	80.	5	16,400
Black Spruce	—	300	25,500	—	74	6,300
Jack Pine	24	400	38,800	15.	1	3,500
Balsam Fir	3	20	2,300	0.6	--	120
Tamarack	--	13	1,100	--	4	380
Subtotal	72	733	76,700	95.6	84	26,700
Hardwoods						
Aspen	100	700	79,500	11.	12	3,250
Black Poplar	50	80	16,800	--	--	--
White Birch	6	60	6,200	0.1	--	20
Subtotal	156	840	102,500	11.1	12	3,270
Total	228	1,573	179,200	106.7	96	29,970

1/ 1958.
2/ Ten-year averages from 1947 to 1956.

Source: Saskatchewan Department of Natural Resources, Forestry Branch.

There are nearly 15 billion board feet of sawtimber in trees ten inches and over at breast height. The available quantity of white spruce, the most desirable sawtimber species, is estimated at 3.5 billion board feet.

The forests are predominantly young, and wood volumes therefore may be expected to increase rapidly as the present stands become more mature. Stands of the large pole class, between 50 to 70 feet in height, form an encouraging reserve of timber. These stands are approaching maturity, and proper cutting practices will help to maintain the logging on a balanced and permanent level until the younger stands reach maturity.

At present, all species except white spruce have growth rates which exceed the annual drain. Under present conditions this means that about 200 million cubic feet are being added to the wood volume annually. It is not likely that this net increment will decline; rather, it should increase, even with more intensive utilization. With greater timber production, better silvicultural practices can be put into effect, such as preparatory cutting in white spruce and thinning of jack pines to improve diameter growth. Under such practices, Saskatchewan's forests should be able to supply wood for a stable forest industry. However, it is doubtful if sawtimber production will ever reach the heights gained during World War II.

Access roads, essential for the operation of any forest industry, are the responsibility of the Construction Branch of the Department of Natural Resources. This branch builds fireguards where necessary, usually along the forest boundaries. They are built to sufficiently high standards to support traffic. Since 1947, more than 1,800 miles of roads, trails, and fireguards have been constructed and are currently being maintained in the commercial forest zone. The road network has now been extended so that very few parts of the forest are inaccessible.

Forest-Based Industries

Saskatchewan has a well-developed manufacturing complex based on forest resources. Five industries, regarded as primary wood users, utilize Saskatchewan's forest resources for production of goods for export and can provide the basis for further fabricating or processing industries within the province. These industries are:

Sawmilling and Remanufacturing
Plywood
Composition Board

Ties, Poles, Posts, and Piling
Fuel and Pulpwood

In 1958 there was production in the province in all of the above enterprises. The other prime wood using industry that could use forest resources, but which is missing from the province's industrial complex, is a pulp and paper mill.

Table 78 shows the trend in utilization of wood from Saskatchewan forests between 1940 and 1955. A comparison between these figures and the allowable annual cut shown in Table 77 indicates a gap between production and consumption, particularly in pulpwood, which could provide the basis for a number of minor wood product industries.

Sawmilling and Remanufacturing

Table 78 shows a decline in sawtimber production since 1943, due to heavy cutting in the past; because of this, sawtimber production (on a sustained yield basis) is not likely to increase significantly for about 25 years.

At the present time, a number of relatively small sawmills and 8 planing mills are operating in the province. The marketing of the output of these mills is handled by the Saskatchewan Timber Board, which sold approximately $5 million worth of lumber in 1958. Most of the lumber exported from the province was sold in the Chicago market.

Although sawtimber production is unlikely to expand significantly in the near future, it does provide an important raw material upon which other industries may be based. The first industry that would be based on sawtimber is lumber remanufacturing; i.e., planing and manufacture of such items as moldings and window and door stocks. This industry is already well established in the province in the form of planing mills and plants manufacturing framing (window and door frames), sashes, and doors. Sash and door manufacturers may also engage in production of prefabricated cabinets, benches, etc., for use in homes, stores, or offices. Expansion of these industries will be governed largely by the future growth in the province's construction industry as a result of increased population and economic activity.

White spruce is the most valuable timber species in the Saskatchewan forests and is well suited to the remanufactured products mentioned above. Other uses for white spruce include small boats, construction timbers, laminated wood products (builtup trusses and beams for long

Table 78

TRENDS IN UTILIZATION OF WOOD FROM SASKATCHEWAN FORESTS
1940–1955

Year	Total		Logs and Bolts for Sawing		Pulpwood		Fuelwood		Poles and Piling		Fence Posts		Other	
	Volume[1] (Mcf)	Value ($000)	Volume[1] (Mcf)	Value ($000)	Volume[1] (Mcf)	Value ($000)	Volume[1] (Mcf)	Value ($000)	Volume[1] (Mcf)	Value ($000)	Volume[1] (Mcf)	Value ($000)	Volume[1] (Mcf)	Value ($000)
1940	113,563	$4,525	36,596	$2,118	665	$ 43	70,469	$1,900	97	$ 10	2,850	$139	2,886	$315
1941	110,858	4,913	37,110	2,275	507	41	67,576	2,117	22	3	2,874	151	2,769	326
1942	106,769	5,232	32,115	2,316	887	109	69,750	2,512	71	9	2,806	151	1,140	135
1943	114,049	6,486	39,611	3,067	4,603	430	65,718	2,677	41	6	2,865	163	1,211	143
1944	112,200	7,227	35,092	3,202	6,982	739	66,512	3,016	53	10	2,809	163	822	97
1945	101,599	7,006	33,330	2,875	7,490	778	55,931	2,810	1,263	277	2,868	171	717	95
1946	87,627	6,223	26,242	2,313	7,607	835	50,067	2,743	308	68	2,757	175	646	89
1947	89,665	7,253	24,471	2,492	11,915	1,538	49,667	2,880	270	60	2,642	171	700	112
1948	82,173	7,019	23,890	2,591	8,677	1,237	45,793	2,807	362	82	2,722	181	729	121
1949	66,324	5,318	17,939	1,836	2,519	351	42,024	2,716	362	94	2,689	191	791	130
1950	70,486	6,593	22,450	2,550	5,292	828	38,513	2,618	899	271	2,531	187	801	139
1951	73,242	8,284	19,300	2,284	9,739	1,436	38,581	3,323	2,063	857	2,714	227	845	157
1952	71,747	7,197	21,828	2,429	6,010	872	39,225	2,967	1,027	490	2,709	256	948	183
1953	71,680	7,591	22,549	2,204	5,042	886	39,345	3,627	1,172	467	2,654	219	918	188
1954	65,326	8,011	21,689	2,763	6,895	1,155	31,200	2,902	1,815	783	2,674	214	1,053	194
1955	55,225	7,497	17,539	2,276	3,900	668	28,909	2,710	2,227	1,410	2,215	277	435	156

1/ Equivalent volume in merchantable timber.

Source: "Operations in the Woods Revised Estimates of Forest Production, 1940-1953, Final Estimates, 1954-1955," D.B.S.

spans in building construction), and lath. Boxes and crates are already being manufactured from the species by three plants in the province. In the main, the market for such products would probably be restricted to Saskatchewan. The Saskatchewan Government Industrial Development Office has made studies of opportunities for the manufacture of glued laminated construction timbers and wooden household furniture. (See Appendix A, Table 91.) A plant is currently planned for Saskatoon for the manufacture of school desks and supplies, office equipment, folding chairs, and humidified sealed windows.

The other significant softwood species, black spruce, jack pine, and balsam fir, if milled, would be primarily used for box and crate stock, although there are opportunities for using jack pine for interior finishing.

In the hardwoods, white poplar, black poplar, and white birch are the dominant species. Poplar is the most abundant Saskatchewan hardwood. The major uses of white poplar timber are boxes and crates, excelsior, cooperage, and matches. By use of careful sawing, seasoning, and grading practices this timber also proves satisfactory for furniture manufacture. Potential uses of white birch timber include heels for ladies shoes, mirror and picture frames, toothpicks, and wood novelties, such as toys, toy furniture, book ends, games, pipe racks, Christmas tree stands, and souvenirs. Well-seasoned and graded birch could also be used for hardwood flooring and interior finishing.

Good kiln drying is essential to produce from birch or poplar high-grade hardwood timber competitive with oak or any other good hardwood.

Plywood

Two plywood plants currently operating in the province are using mainly white poplar, with an approximate annual capacity of 8 million square feet of quarter-inch material, interior grade. The products of these mills have moved into eastern Canadian markets, as well as into the Prairie market. However, in recent years Saskatchewan plywood has met increasing competition from expanded production capacity in Ontario mills. Currently, the major uses of interior grade poplar plywood are in furniture, subflooring, and interior sheathing. Interior sheathing grades of plywood are estimated to be almost 7 percent of the total Prairie plywood market.[1/]

1/ Economic Study of Wood Particle Board Plant Proposed for Saskatchewan, August 1958, Stevenson & Kellogg, Ltd.

Saskatchewan comprises about 25 percent of the Prairie plywood market. Although there is a substantial import (approximately 80,000 tons in 1957) of plywood into the Prairie Provinces,[1/] most of this is exterior grade. An opportunity for expanded production of interior grade plywood for the Prairie market is limited. However, some expansion should be possible if a sufficiently high grade can be produced in 4-foot by 8-foot sheets, and if satisfactory veneers could be developed, so that some of the production could be used in interior finishing.

Paper and Pulp

The following discussion is a summary of Part II of this report, which is a separate volume entitled "Prospects for Pulp and Paper Mill Development in Saskatchewan, Canada," prepared by Sandwell & Company Ltd. and Stanford Research Institute.

The major gap between utilization of Saskatchewan forests and allowable cut is in the pulpwood category. There are over 12 million acres of vacant productive forest land in Saskatchewan. Most of the accessible productive forest lands are owned by the Crown, and are unoccupied. In the four areas selected by the Forestry Branch, Department of Natural Resources for pulp and paper mill development, approximately 10 billion cubic feet of wood are available, of which about 5-1/2 billion are softwoods, the preferred species for pulp and paper production. According to government representatives, a qualified pulp and paper organization can obtain timber rights to these Crown forest lands on a very attractive price basis, through one simple agreement with the government. This is in contrast to the sometimes very complex and expensive arrangements necessary where multiple ownerships and competitive influences are involved.

The allowable annual cut of the above area is about 247 million cubic feet, of which about 118 million are in softwoods and the balance in hardwoods. Saskatchewan has available on this basis wood of the preferred species adequate to support about half a dozen pulp mills of 300 tons per day capacity.

Although many areas of the United States and Canada have forest resources which are also attractive for pulp and paper, those of Saskatchewan may be unique, inasmuch as there is no established mill in or

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1/ Economic Study of Wood Particle Board Plant Proposed for Saskatchewan, August 1958, Stevenson & Kellogg, Ltd.

near the area. The favorable availability of wood resources on a continuing basis throughout future years, added to the apparent advantageous location near the rapidly growing market of the midwestern United States, suggests that the Saskatchewan forest resources should be of substantial interest to those concerned with the production of paper products for the U.S. Midwest market.

In considering the market possibilities for potential Saskatchewan pulp-producing capacity it is necessary to examine markets for paper and paperboard, newsprint, and pulp.

The characteristic market distribution of Canadian-produced pulp and paper, as shown in Table 79, would indicate that, in general, any Canadian producer (and in this case, a new entrant into that industry in Saskatchewan) would probably be primarily concerned with sales opportunities for newsprint and unconverted pulp in the United States.

The small magnitude of the Canadian exports of paper and paperboard (other than newsprint) to the United States is partially accounted for by the fact that the United States imposes tariffs ranging from 3.75 percent to 15 percent ad valorem. These tariffs have proved an effective barrier to the entry of these products into the United States from all countries. As a result, Canada itself must be viewed as the principal market for nonnewsprint paper and paperboard produced in Canada.

It is estimated that in 1957 the Prairie Provinces consumed about 17.36 percent of the paper and paperboard consumed in Canada, or about 310,000 tons of paper and paperboard in the form of products. However, the competitive factors in the Canadian industry, together with the great diversity of paper and paperboard products consumed, are such that it is unreasonable to assume that there is room for any increase in capacity in the Prairie Provinces. Nevertheless, the possibility of converting a portion of the potential pulp production to paper and paperboard would exist at some future time when the Prairie market has grown sufficiently to justify it.

The possible markets for any potential Saskatchewan newsprint capacity would probably be restricted to the Prairie Provinces and the United States Midwest.

The present consumption of newsprint by the Prairie Provinces is estimated at approximately 75,000 tons annually. It is further estimated that this market will not exceed 125,000 tons per year by 1975. These provinces are supplied primarily by newsprint mills in British Columbia and Manitoba, which, in 1957, had a total annual capacity of

Table 79

CANADIAN WOOD PULP DISTRIBUTION
1957

Item	Amount (thousand tons)	Wood Pulp Equivalent (thousand tons)
Newsprint		
Exported overseas	850	
Exported to United States	5,100	
Consumed in Canada	450	
Subtotal	6,400	
Equivalent Wood Pulp		6,700
Unconverted Pulp		
Exported overseas	300	
Exported to captive United States market	800	
Exported to United States	1,200	
Subtotal	2,300	
Wood Pulp		2,300
Other Paper and Paperboard		
Consumed in Canada	1,700	
Exported to United States	125	
Exported Overseas	125	
Subtotal	1,950	
Equivalent Wood Pulp		1,500
Total Wood Pulp Production		10,500

Source: The Pulp and Paper Industry, 1957, D.B.S.

about 750,000 tons and 139,000 tons, respectively. It is unlikely that a Saskatchewan mill would capture the whole of this market. Thus, the major outlet would need to be the United States Midwest, whose newsprint consumption is projected to increase from 2.1 million tons in 1957 to 3.1 million by 1975. However, in view of the favorable position of existing Canadian mills, and potential United States capacity, it is considered that the factors favorable to the establishment of a newsprint mill in Saskatchewan are outweighed by the unfavorable factors.

In production of market pulp a Saskatchewan mill could not be predicated solely on the demand of potential converters in the Prairie Provinces. It would seem that any such mill would necessarily have to look to the United States for markets for most of its output.

While the outlook for pulp mill development does not appear to be promising at the present time, in view of the supply situation in both Canada and the United States (the Canadian industry operated at only 85 percent capacity in 1957 and the United States industry at 83 percent), there will be a production and capacity gap to be filled in the future.

Table 80 gives projected United States consumption of wood pulp.

Table 80

PROJECTED U.S. WOOD PULP CONSUMPTION
1957-1975

Year	Consumption (thousands of tons)
1957	23,399
1960	26,973
1965	32,672
1970	38,815
1975	46,083

Source: U.S. Pulp Producers Association, 1957.
1960-75 - SRI projections.

The projected consumption of wood pulp in the United States in 1965 will exceed the 1959 capacity by about 4.3 million tons; in 1970, by about 10.4 million tons; and in 1975, by about 17.7 million tons. Thus, there is a future capacity gap for which Saskatchewan can compete. However, it is expected that there will be increasing competition to Canadian market pulp on the U.S. market from domestic producers.

The bleached and semibleached grades of sulphate wood pulp are the only grades in which imports in the United States have shown an increase and are likely to show an increase in the future. These, then, would offer the best prospects for a mill in Saskatchewan producing pulp for export to the United States. At the same time, these are the grades that are most susceptible of expansion by United States producers.

Taking all factors into account it is likely that a new mill would best develop as a captive mill of a large paper and paperboard producer in the Great Lakes or northeastern regions of the United States. Enterprises most likely to be interested in Saskatchewan would be those which are currently short of wood supplies to maintain pulp output. A converter with no wood or pulp capacity, interested in "backing into" an integrated position, would also be a candidate to establish a mill in the province.

The establishment of a pulp mill in Saskatchewan is unlikely to lead to the establishment of pulp converters for a considerable period of time. However, a potential pulp mill could ultimately expect to utilize a portion of its capacity for paper and paperboard production to supply a paper converting industry. Martin Paper Products, opened in 1959, is the first paper converter to establish in the province.

Composition Board

Considerable attention has been given to the possible development of composition board production in the province--the Industrial Development Office has completed studies covering opportunities for manufacture of softboard, hardboard, chipboard, blockboards, and building boards. In addition, the Government Finance Office recently employed a firm of consulting engineers to investigate the economic feasibility of a particle board plant.

The production of composition board is primarily dependent on wood wastes which result from such operations as sawmilling, planing, and plywood manufacture. The raw materials would take the form of forest waste, such as stumps, tops, large branches, small logs, and inferior

species; and mill and factory waste, such as slabs, edgings, trimmings, short boards, planer shavings, and plywood veneer cores. One plant in the province, the Prairie Fibreboard Company, utilizes a mixture of wheat straw and wood chips.

An important factor in the manufacture of composition board is a source of raw materials in a relatively confined area to reduce transport costs. For this reason, the Saskatchewan Timber Board is giving serious consideration to centralizing sawmilling operations. This scheme is designed to provide a volume of low-cost wood wastes sufficiently large that it should be feasible to manufacture composition board. If necessary, raw material supplies could be supplemented by chipping cordwood.

It is probable that composition board produced in Saskatchewan will have to be marketed primarily in the Prairie Provinces, although there is no reason to expect that a limited amount of a good quality product could not find an outlet either in eastern Canada or Chicago. This product would have to compete mainly with plywood and, to a limited extent, with building lumber, as well as with composition board from other parts of Canada. The largest sector of the Prairie market for which these boards might compete appears to be that sector currently held by the waterproof sheathing grades of plywood used in exterior applications, which account for 50 to 60 percent[1/] of Prairie plywood consumption. None of the waterproof plywood used in the Prairie Provinces is produced in Saskatchewan; thus, manufacture of such a product would not be a threat to existing plywood industries in the province.

An important factor affecting the competitive position of composition board will be developments in production technology leading to improved or lower cost products.

Besides composition board, other uses for forest mill and factory wastes include production of boxes and crating stock, snow fence, lath, and wood fiber filler (filler in roll roofing, building felts, and composition shingles). In addition, white spruce waste can also be used for stepladders and cable reels, and white birch can be used for shovels, wood novelties, and charcoal.

1/ Economic Study of Wood Particle Board Plant Proposed for Saskatchewan, August 1958, Stevenson & Kellogg, Ltd.

With a centralized sawmilling operation, by-products from sawdust would be worthy of consideration. Such products would include briquette fuel (sawdust shavings compressed with or without artificial binders), firewood, inlaid linoleum (primarily from hardwood sawdust), light-colored plastics, cleaning compounds, casting and molding materials, and porous clay, tile, and brick (lightweight brick and tile produced by burning sawdust filler and creating small cavities in the product). The products mentioned above would constitute very minor usage, but nevertheless would contribute a number of small industries or sidelines for larger industries.

Ties, Poles, Posts, and Piling

In recent years the cutting of ties, poles, posts, and piling has been limited in order to preserve pulpwood stands. A fairly stable market exists for railway ties and posts. The Saskatchewan Power Corporation has been the major buyer of poles. With the completion of the Power Corporation's rural electrification program within the next 2 or 3 years this market will decline unless an outlet is found outside the province. Freight charges will be the limiting factor in selling in such markets as Chicago.

Fuel and Pulpwood

There is likely to be increasing demand for pulpwood from eastern mills, which are continually going farther afield in search of raw materials. Fuelwood demand is likely to continue to decline (see Table 78) as other sources of heat, such as electricity, oil, and natural gas, become more widely used.

Fish

Fisheries, while not potentially important to the Saskatchewan economy in comparison with such resources as forests and minerals, are nevertheless an important source of income to the majority of the 16,000 people native to the northern regions of the province. Table 81 shows the trend in quantity and value of fish since 1930. Since the early 1940's, the industry has remained relatively stable, in terms of both quantity and value in constant dollars. The major commercial species are whitefish (about 60 percent), trout (about 20 percent), pickerel (about 10 percent), and tullibee (about 10 percent). In addition to commercial fishing, important uses of fish are for feed in ranching and for angling (angling is discussed in Section VII).

Table 81

FISHERIES STATISTICS OF SASKATCHEWAN
1926-1956

Year	Quantity (thousands of pounds)	Value (thousands of dollars)			
		Landed		Marketed	
		Current	Constant[1/]	Current	Constant[1/]
1926	n.a.	$ n.a.	$n.a.	$ 444	$317
1927	n.a.	n.a.	n.a.	504	360
1928	n.a.	n.a.	n.a.	564	403
1929	6,116	375	254	573	388
1930	4,684	125	94	235	176
1931	5,261	178	169	318	303
1932	3,614	113	126	186	208
1933	4,182	98	111	186	211
1934	4,038	116	117	220	221
1935	4,953	146	149	252	257
1936	6,450	183	186	367	372
1937	9,776	283	283	527	527
1938	8,781	250	251	469	471
1939	8,724	229	224	479	469
1940	7,246	228	197	404	349
1941	7,845	261	208	414	330
1942	8,180	384	259	586	396
1943	10,487	773	443	1,155	662
1944	12,959	1,032	580	1,482	834
1945	10,022	882	453	1,286	661
1946	7,797	729	343	1,149	540
1947	8,020	484	209	1,171	506
1948	8,076	513	202	1,282	505
1949	7,473	521	202	1,026	399
1950	8,731	718	275	1,360	522
1951	11,512	910	321	1,748	616
1952	10,612	679	244	1,440	516
1953	8,481	553	213	1,281	494
1954	10,524	741	282	1,644	626
1955	10,152	763	278	1,617	590
1956	9,441	784	264	1,766	595

1/ Current dollars were converted to constant 1935-39 dollars by use of the wholesale price index for fishery products.

Sources: Advance Report on the Fisheries of the Prairie Provinces, D.B.S. Fisheries Statistics of Canada, Prairie Provinces, D.B.S.

Three factors govern the expansion of the supply of fish for industrial use:

1. The physical capability of the 400 reported lakes (which comprise a water area of approximately 31,000 square miles) to produce fish. Certain lakes in the Precambrian area in particular have limited fertility; thus, a policy of stocking them would have little effect on fish production. A possibility for increasing production lies in utilization of remote lakes not currently fished, or fertilizing the lakes. In the southern lakes, stocking has increased fish production, thus allowing more angling, which is the primary use of these lakes. These well-stocked southern lakes provide facilities for anglers who would otherwise increase the sport fishing pressure on the northern lakes.

2. The competition for the fish resources between commercial fishermen, fur ranchers, and anglers. Many of the fish species used by the fur ranchers are not suitable for sport or commercial fishing. However, with expansion of fur ranching there may be a demand for commercial and game fish by fur ranchers. The sevenfold increase in angling licenses in Saskatchewan between 1948 and 1958 is ample evidence of the rapidly increasing interest in sport fishing. In the creel census made by the Department of Natural Resources it was estimated that on a per-pound basis, fish taken by anglers earned substantially more for the province than fish taken by commercial fishermen. However, it is very unlikely that angling would develop to the point of using all available fish; at the same time the people of the north must be provided with a means of earning a livelihood, and one of these means is commercial fishing. However, the rapid expansion of sport fishing, although this activity is a highly desirable revenue earner for the province, is likely to limit commercial fishing in many areas unless increasing the fishing limits becomes feasible, or operations are expanded to lakes which are currently not fished to the limit.

3. Cost of production. The discussion above has centered upon the supply of fish and alternative uses of this supply. The cost of delivery of the fish to the packing plant and transportation to the market is an important factor in commercial fishing; a reduction in cost would enable the Saskatchewan fish to be more competitive in Canadian and United States markets. The new road from La Ronge to Uranium City should lead to substantial reduction in transportation costs from many northern lakes.

In addition to transportation, improvement in fish harvesting techniques is a necessary prerequisite to reducing costs and will inevitably lead to larger scale operations. Improved efficiency in harvesting and transportation would permit the extension of commercial fishing to more remote lakes. The provincial government in recent years has subsidized commercial fishermen to the extent of approximately $30,000 annually. Improvement in production costs would help reduce or eliminate this payment.

An important factor which must be taken into account when considering Saskatchewan's fish resources is the relationship of these resources to the welfare of the northern people. In view of the limited capacity of the northern lakes, a trend toward large-scale methods of fish harvesting would ultimately lead to a decrease in the number of fishermen. Such a trend would create a serious problem for those in the government responsible for the welfare of the northern population. These people, who are largely Indian or Metis, are increasing in number and are reluctant to move. In the past, alternatives to fishing have been limited, apart from trapping, which is discussed below. However, it is expected that with development of the north's many resources, particularly minerals and forests, alternative opportunities will be available which will allow more efficient utilization of the labor resources of the area.

The extent of Saskatchewan's fish resources has not been estimated in terms of volume, species, food supply, and potential for increase. However, many lakes are currently not fully utilized. Commercial fishing in these lakes is likely to become feasible with the extension of northern roads and improved air services. Thus, it is expected that in spite of increased sport fishing and possibly a slight increase in fish consumed on fur ranches, the fish resources of the north will be sufficient to support a moderate expansion in commercial fishing. The market for commercial fish, mainly whitefish, is assured. Saskatchewan fish have moved primarily into the United States Midwest (80 percent) through the two big fish markets of Chicago and Detroit; this situation is likely to continue. There is every reason to expect the U.S. Midwest to continue to grow in population, and consumption of fish should remain at about present levels or show a slight increase, although United States figures on per capita consumption show a slight decline since 1953 (see Table 82). With improved transportation facilities, Saskatchewan should be able to compete favorably with other suppliers in Alberta and Manitoba.

Commercial fishing in 1958 accounted for less than 1 percent of provincial production from all industries, and in view of the potential growth possibilities available in other sectors of the economy, it is likely that its proportion will remain negligible.

Table 82

PER CAPITA FISH CONSUMPTION IN THE UNITED STATES
1949-1957
(Edible Weight in Pounds per Year)

Year	Fresh and Frozen			Canned						Cured	Total Fish
	Fish	Shellfish	Total	Salmon	Sardines (pilchards and herring)	Tuna	Shellfish	Other	Total		
1949	4.1	1.7	5.8	1.5	1.0	1.0	0.2	0.4	4.1	0.6	10.5
1950	4.4	1.9	6.3	1.4	1.1	1.2	.2	.4	4.3	.6	11.2
1951	4.6	1.7	6.3	1.4	0.8	1.1	.3	.4	4.0	.6	10.9
1952	4.7	1.6	6.3	1.4	0.5	1.5	.2	.5	4.1	.6	11.0
1953	4.8	1.7	6.5	1.3 1/	0.5 1/	1.6 1/	.2 1/	.7 1/	4.3	.7	11.4
1954	4.8	1.6	6.4	1.3 1/	0.7 1/	1.7 1/	.2 1/	.5 1/	4.4 1/	.7	11.3
1955	4.5	1.5	6.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	.7	10.4
1956	4.1 1/	1.6 1/	5.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	.6	10.2
1957	4.1 1/	1.6 1/	5.7	1.0	0.5	1.6	0.2	0.5	3.8	0.6	10.1

1/ Preliminary.

Sources: U.S. Dept. of Agriculture, Agricultural Marketing Service, Supplements for 1954 and 1957 to Consumption of Food in the United States 1909-1952, Agricultural Handbook No. 62, October 1955 and August 1958.

The only industrial expansion based on fish, in addition to existing filleting, freezing, and packing plants, is likely to be an extension of the process carried out by these plants, such as precooking, smoking, packaging, and preparation of special items, such as patties or fish sticks.

Fur

As with commercial fishing, trapping and fur farming are major activities in the northern region of Saskatchewan. Table 83 shows the production of both ranch-raised and wildlife pelts from 1933 to 1957. The figures for both production and value show wide year-to-year variations, with the only definable growth trend occurring prior to World War II. The figures reflect the vagaries of the fur industry since 1944. The table also shows the variability of wild fur production; this may be attributed to (1) fluctuating supply of animals as a result of yearly differences in food supply, weather, water levels, predators, and disease; (2) variations in the number of trappers as a result of alternative opportunities or of wide price fluctuations, which may be either discouraging or encouraging; and (3) variability both in quality and number of individual fur-bearing species available.

One of the major problems in administering wild fur resources in the north has been underharvesting, with the result that food supplies are insufficient to keep the fur-bearing animals healthy. Thus, the fur-producing capacity of northern Saskatchewan is considerably higher than current levels of production. However, the attainment of the potential depends primarily on the markets and prices received for the furs in relation to alternative opportunities for the population to earn a living.

Alternative opportunities are likely to remain limited for some time, in spite of the expanding activity in mining, forestry, and tourism in the north, because of increasing population and reluctance to move south. Table 83 demonstrates the unpredictability of the fur market. Saskatchewan furs are sold by auction in Regina at prices that may truly be termed world prices. Manufactured furs are sold primarily in a luxury market centered in large urban areas. The nature of this market is determined mainly by fashion. In addition to this unsettling influence, fur in recent years has had to face competition from an increasing number of luxury items, such as travel, entertainment, and pleasure craft. In view of these factors, there seems no reason to expect the Saskatchewan fur industry to show a consistent trend either upward or downward.

Table 83

NUMBER AND VALUE OF PELTS PRODUCED IN SASKATCHEWAN 1933-1957

Year	Wildlife						Ranch-raised			
	Total Value of Pelts (thousands of dollars)		Number (thousands)	Value (thousands of dollars)		Value per Pelt (constant dollars)[1/]	Number (thousands)	Value (thousands of dollars)		Value per Pelt (constant dollars)[1/]
	Current	Constant[1/]		Current	Constant[1/]			Current	Constant[1/]	
1933	$1,201	$1,689	872	$1,007	$1,416	$1.62	7	$194	$273	$39.0
1934	1,431	1,966	1,534	1,236	1,698	1.11	7	195	268	38.3
1935	1,263	1,453	997	1,050	1,208	1.21	7	213	245	35.0
1936	n.a.	n.a.	n.a.	n.a.	n.a.	--	n.a.	n.a.	n.a.	n.a.
1937	1,327	1,038	1,826	960	751	.41	13	367	287	22.1
1938	852	1,061	718	461	574	.80	19	391	487	25.6
1939	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1940	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1941	2,326	1,615	975	1,428	992	1.02	51	898	624	12.2
1942	2,245	1,489	3,781	1,680	1,114	2.95	32	565	375	11.7
1943	2,441	1,666	1,127	1,632	1,114	.99	47	809	552	11.7
1944	3,438	2,543	1,079	2,372	1,754	1.63	28	1,066	788	28.1
1945	2,311	1,694	891	1,544	1,132	1.27	34	767	562	16.5
1946	3,672	2,674	1,096	2,771	2,018	1.84	36	901	656	18.2
1947	2,304	1,202	1,032	1,528	797	.77	54	776	405	7.5
1948	3,501	1,602	1,107	2,508	1,147	1.04	75	993	454	6.1
1949	2,248	1,068	1,642	1,992	946	.58	25	256	122	4.9
1950	2,359	914	1,039	1,992	771	.74	n.a.	367	142	n.a.
1951	2,806	895	824	1,985	633	.77	52	821	262	5.0
1952	2,140	1,520	1,132	1,720	1,222	1.08	32	419	298	9.3
1953	2,668	1,730	1,453	2,121	1,375	.95	40	546	354	8.8
1954	1,826	1,581	1,002	1,383	1,197	1.19	39	443	384	9.8
1955	4,556	3,983	2,676	3,715	3,247	1.21	45	841	735	16.3
1956	3,446	2,570	2,256	2,837	2,116	.94	49	609	454	9.3
1957	2,991	2,478	1,380	2,143	1,775	1.29	62	848	703	11.3

1/ Current dollars were converted to 1935-1939 constant dollars by use of the wholesale price index for hides and skins.

Sources: Fur Production, Season 1950/1951-1956/1957, D.B.S. annual report. Fur Production of Canada, 1944/1945-1947/1948, D.B.S. annual report. Annual Report of the Dept. of Natural Resources of Saskatchewan, 1932-1943.

Industries based on fur are likely to be limited to supplying the provincial market. There are currently six enterprises in Saskatchewan that utilize pelts. As the world fur market is centered in large urban centers, such as Montreal, New York, Paris, and London, the establishment of a significant industry in Saskatchewan for the manufacture of fur clothing for export appears unlikely. However, in certain specialty items, such as fur caps, where the market is not dictated by fashion, there is no reason why a local industry should not compete in both Canadian and foreign markets.

Renewable Resources Development Program

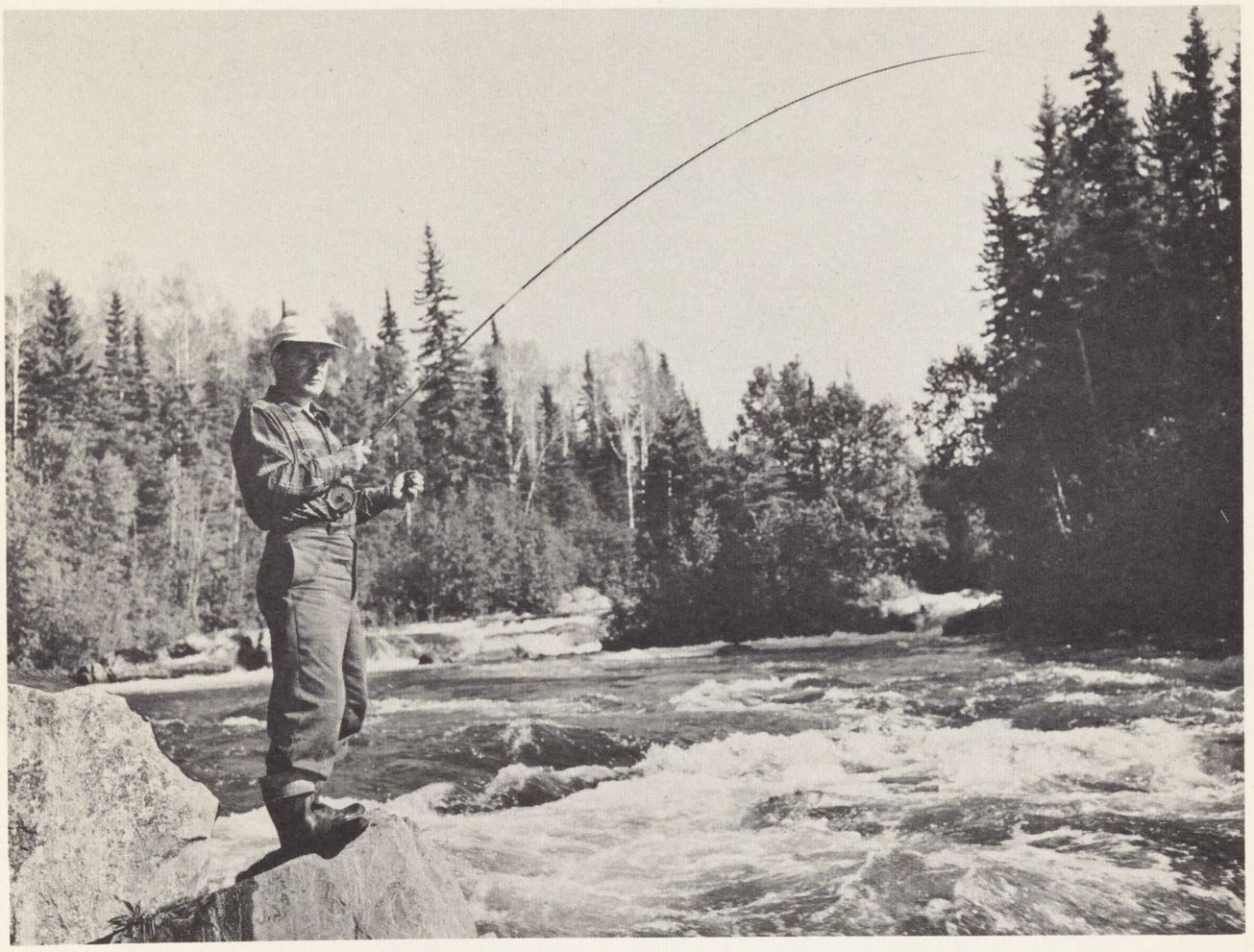
The government agencies mainly responsible for programs to develop renewable resources are the Department of Agriculture and the Department of Natural Resources. Agriculture was the subject of extensive investigation by the Royal Commission on Agriculture and Rural Life, whose findings were published in 1957. In view of this study, no consideration has been given in this report to policies oriented to agricultural development.

The Department of Natural Resources has been extremely active in recent years in reviewing its program of resource development. The development of fish and fur resources is intricately associated with the advancement of the northern people, which poses certain social problems. The Department of Natural Resources has carried out a number of anthropological studies in order to determine goals for social as well as economic development.

In the forest resources, considerable emphasis has been laid on the importance of establishing a pulp and paper mill. The Forestry Branch might continue to give consideration to the possibility of managing the forests for uses other than pulp and paper. In considering the forest resource, the following factors might be taken into account: (1) the value of the resource at present in all alternative uses, (2) the potential value of the resource for all alternative uses. The obvious appreciation due to increased volume of wood in larger dimensioned trees must be considered in relation to the discounted value of the resource in the future (to compensate for postponing present consumption in favor of expected increased future consumption, and as an allowance for the risk that what is currently an economic resource may not be as valuable at some period in the future, due to substitute products).

Section VII

TOURIST AND RECREATION RESOURCES



Angling in the Montreal River, Northern Saskatchewan

SASK. GOV'T PHOTO

Section VII

TOURIST AND RECREATION RESOURCES

Saskatchewan's interest in development of recreation resources is twofold. The first is to provide improved facilities for the local population, thus increasing the attractiveness of the province as a place to live and encouraging local people to spend money within the province rather than seeking recreation outside the province. The second is to provide facilities which will attract expenditures by tourists from outside the province. That sector of the tourist industry which caters to tourists from outside the province may be regarded as a "basic" industry, and therefore of considerable importance to Saskatchewan's growth and development. The sector which caters to the provincial residents is no less important and may be regarded as a "service" industry. To the extent that the latter provides a service in the province which the residents otherwise would have sought outside, it is also a factor having a direct influence on the growth of the economy.

The last decade has seen a striking transformation of the province of Saskatchewan as a tourist area. In the past, Saskatchewan tourist trade has been restricted by limited recreational facilities, inadequate internal transportation, relative isolation from large population centers, and lack of promotion. Recently, however, there have been a number of developments which have sharply increased the tourist potential of the province. The fourfold increase in the amount of bituminous surfaced provincial highways in the ten years from 1947 to 1957 has made the already established recreational facilities of the province more accessible. The construction of the Trans-Canada highway and improved air services have particularly reduced the handicap of isolation from large centers of population. Furthermore, the construction of development roads into northern Saskatchewan has considerably broadened the base of recreational facilities in the province. In addition, there has been considerably increased interest in tourism on the part of both the provincial government and the general public which has led to increased promotional activities and increased investment in more adequate facilities. An indication of the new importance attached to the tourist industry in Saskatchewan was the establishment in 1957 of a new government department, the Department of Travel and Information, whose principal function is the promotion of the increased use of the recreational facilities of the province.

Recreation Attractions

Southern Saskatchewan has unique scenic attractions--the prairie vista of treeless plain and rolling hills in the south; and the wide glacial valleys, parklands, and colored clay formations in the Big Muddy Valley. Cypress Hills is also one of the distinctive regions of northern North America. It is one of the few areas in Canada not covered by glaciers in the ice age; as a result, it has many semitropical plants that are more closely related to species found in New Mexico than to those found in the surrounding areas.

The variety of scenery and recreational opportunities available in the province is not generally realized by potential tourists in other parts of Canada and the United States. Indeed, there are many Saskatchewan residents who are unaware of this variety. To gain a full appreciation of this changing scenery, a tourist should travel from south to north rather than from east to west, which is the general rule. A problem of Saskatchewan's tourist industry is to devise means of inducing the traveler to take the south-north routes and so enjoy most of the province's recreation resources.

The principal tourist attractions of Saskatchewan lie not in scenery but in excellent fishing and hunting opportunities. The province is part of the largest water fowl nesting area in the world, and game bird shooting is particularly good in many areas. Even in the south, good opportunities for big game hunting are available. However, the best fishing and hunting is in the northern unspoiled wilderness: northern Saskatchewan, with its forests, lakes, and rivers, is the area of maximum tourist potential. This area offers hunting, fishing, camping, boating, and swimming.

The numbers of people who are seeking hunting and fishing facilities are growing steadily, as shown by statistics for fishing and game licenses issued in Saskatchewan (see Table 84).

Accessability of Recreation Areas

In spite of its recreation resources, northern Saskatchewan has until recently been almost inaccessible to the general public. Apart from the 1,500 square miles encompassed by the Prince Albert national park (established in 1927), there has been relatively little attempt to develop this vast potential tourist area. Prince Albert national park has been linked to Saskatoon by paved highway only since 1951. The road to Lac la Ronge was completed in 1950. Although the Nipawin and

Table 84

GAME AND ANGLING LICENSES ISSUED
IN SASKATCHEWAN
1947-1958

Year	Game Bird		Big Game		Angling	
	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident
1947	20,009	318	12,209	33	13,575	3,372
1948	28,719	433	15,560	82	17,040	4,374
1949	31,253	287	19,023	101	26,610	5,030
1950	34,309	416	13,308	128	33,336	5,366
1951	44,307	755	22,832	37	38,225	6,275
1952	53,678	975	35,035	8	50,113	6,615
1953	53,778	1,374	37,164	26	61,384	6,650
1954	54,879	1,767	35,974	44	65,792	6,147
1955	57,902	2,268	29,491	18	78,988	6,658
1956	57,955	3,273	36,903	105	84,889	7,144
1957	58,456	3,577	45,579	201	99,863	7,459
1958[1/]					89,339	6,309

1/ Sales to October 21, 1958, of angling licenses only.

Source: Saskatchewan Department of Natural Resources.

Lac la Ronge provincial parks were established approximately a quarter of a century ago, development has begun to take place only recently. Two new provincial parks have been established in the northern region within the last three years; one (Meadow Lake provincial park) along the Waterhen River and lakes in the western part of the area; and the other, a small one, primarily for historic purposes, at Lac Ile-a-la-Crosse.

Relatively few tourists attempted to penetrate this region prior to 1950 because of the long and wearying journey over rough, gravelled, or dirt roads. However, an extensive system of paved highways now provides the opportunity to drive in comfort to the fringes of settlement.

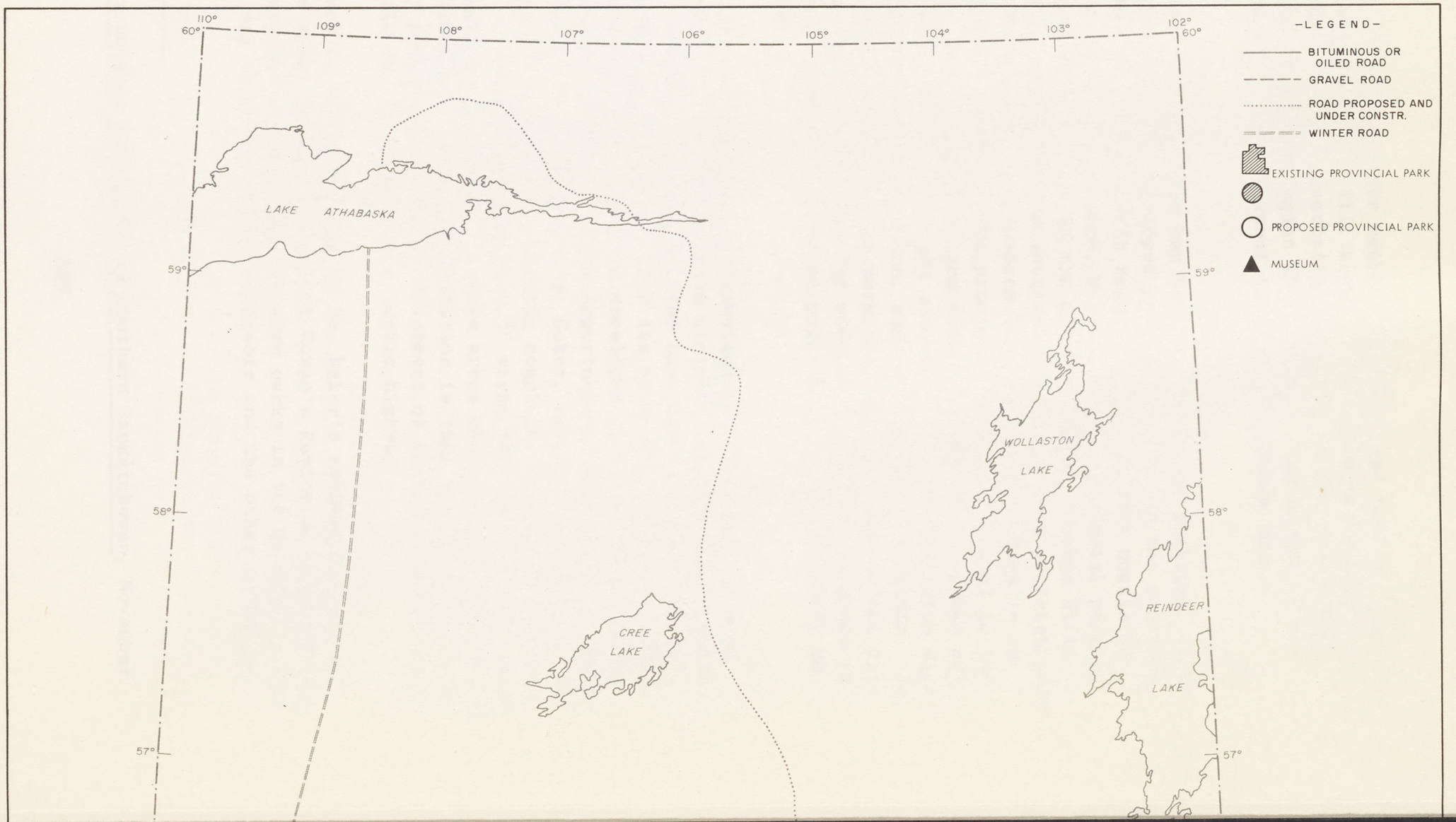
Of equal importance in opening up the north to tourists has been the construction within the wilderness area of a series of roads designed primarily to provide access to the timber resources. On the west, roads have been constructed north from Meadow Lake provincial park to Keeley and Canoe lakes. On the east, the new road from Green Lake to Buffalo Narrows has opened up the resort areas of Lac la Ronge and Lac Ile-a-la-Crosse. This road is projected to continue to the La Loche area on Methy Lake. (See Figure 35.) Still further east is a new road to Dore Lake. The most extensive project is the road planned to link Lac la Ronge with Uranium City on Lake Athabaska. This road, now under construction, is expected to reach the Churchill River by the summer of 1960. In the extreme eastern area another series of resource roads link Candle Lake and Nipawin provincial park; and a new provincial highway, currently under construction, will open up the area between the Nipawin provincial park and Amisk Lake near the Manitoba border. Most of the principal resource roads are gravelled. However, for increasing tourist travel, many of the existing roads will require improvement.

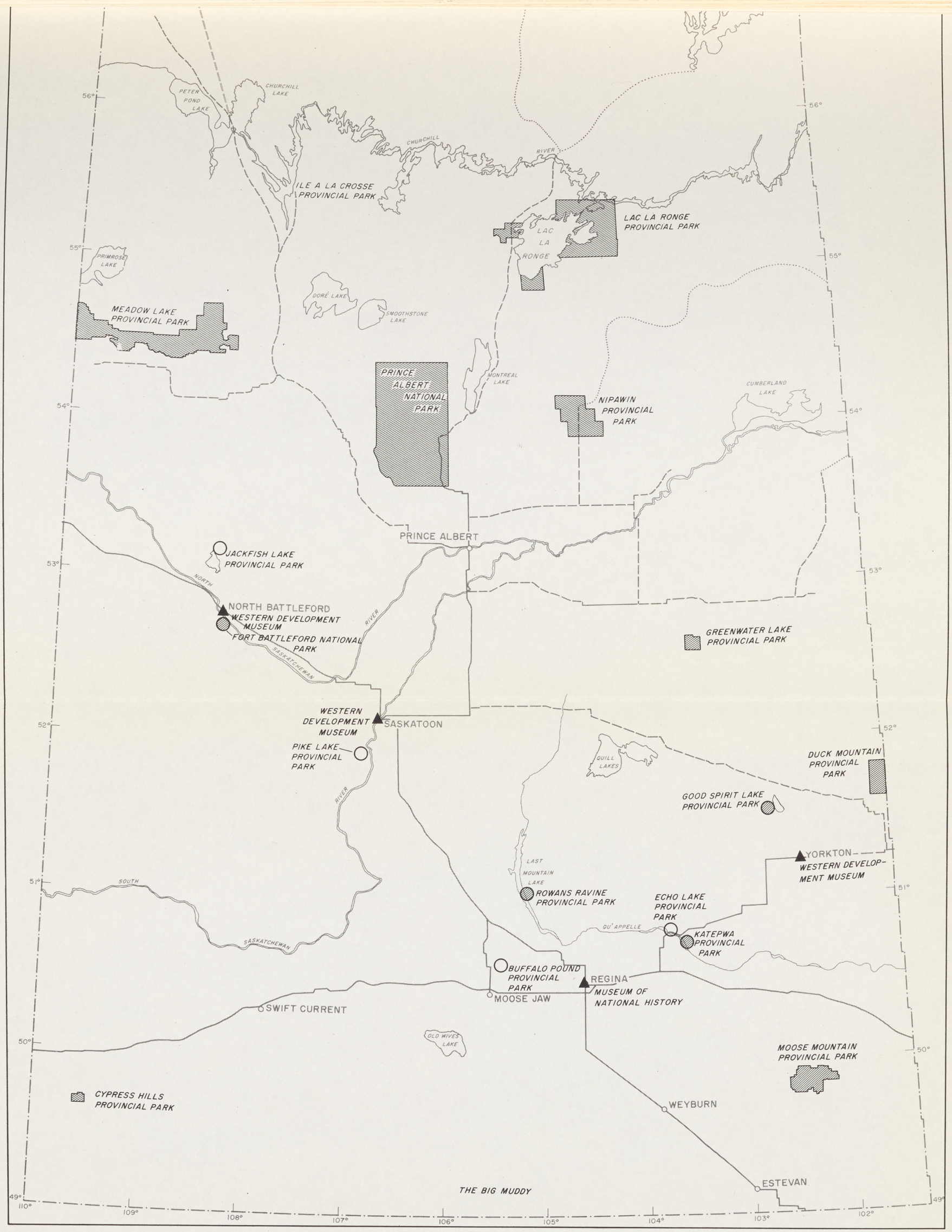
On the more remote lakes inaccessible to automobiles, amphibious aircraft have made it possible to establish private fishing camps (21 listed in the directory published by the Department of Travel and Information). This form of tourist activity has shown rapid growth in recent years.

The recreational resources of an area can be examined from the viewpoint of their suitability both for local residents and also for outside tourists. Then, too, local residents have a dual interest in recreational facilities, the one for weekend trips and the other for the longer vacation periods. Therefore, the location of recreation areas in relation to the region's main centers of population will go far to determine the type of use the residents of the region will make of them. Location of recreation facilities close to provincial population centers will lead

FIG. 35

TOURIST AND RECREATION AREAS OF SASKATCHEWAN




PETER POND LAKE
CHURCHILL LAKE
CHURCHILL RIVER
ILE A LA CROSSE PROVINCIAL PARK
LAC LA RONGE PROVINCIAL PARK
LAC LA RONGE
PRIMROSE LAKE
DORÉ LAKE
SMOOTHSTONE LAKE
MEADOW LAKE PROVINCIAL PARK
PRINCE ALBERT NATIONAL PARK
MONTREAL LAKE
NIPAWIN PROVINCIAL PARK
CUMBERLAND LAKE
PRINCE ALBERT
JACKFISH LAKE PROVINCIAL PARK
NORTH SASKATCHEWAN RIVER
NORTH BATTLEFORD
WESTERN DEVELOPMENT MUSEUM
FORT BATTLEFORD NATIONAL PARK
GREENWATER LAKE PROVINCIAL PARK
WESTERN DEVELOPMENT MUSEUM
SASKATOON
PIKE LAKE PROVINCIAL PARK
SOUTH SASKATCHEWAN RIVER
QUILL LAKES
DUCK MOUNTAIN PROVINCIAL PARK
GOOD SPIRIT LAKE PROVINCIAL PARK
YORKTON
WESTERN DEVELOPMENT MUSEUM
LAST MOUNTAIN LAKE
ROWANS RAVINE PROVINCIAL PARK
ECHO LAKE PROVINCIAL PARK
QU'APPELLE
KATEPWA PROVINCIAL PARK
BUFFALO POUND PROVINCIAL PARK
REGINA
MUSEUM OF NATIONAL HISTORY
MOOSE JAW
SWIFT CURRENT
OLD WIVES LAKE
MOOSE MOUNTAIN PROVINCIAL PARK
CYPRESS HILLS PROVINCIAL PARK
WEYBURN
ESTEVAN
THE BIG MUDDY
56°
55°
54°
53°
52°
51°
50°
49°
110°
109°
108°
107°
106°
105°
104°
103°
102°

to their greater utilization for weekend purposes, and thereby stimulate investment in facilities that will also be attractive to outside tourists. On the other hand, if recreational facilities are remote from centers of population of the region there will be less incentive to proceed with the type of development that would increase tourist potential.

Unfortunately, Saskatchewan has been in the latter position. With only one exception, the six developed provincial parks in the southern region are unfavorably located with respect to the densely populated areas (see Figure 35). For instance, Moose Mountain provincial park is in the extreme southeast corner of the province, while Cypress Hills provincial park is in the extreme southwest, both in areas of relatively low population density and far removed from the large centers in the province. Similarly, Duck Mountain provincial park is adjacent to the Manitoba border, while Good Spirit and Greenwater provincial parks are located in the same general area; all are more than 160 miles from significant concentrations of population, such as Regina or Saskatoon. In fact, the only developed provincial park located within convenient distance of a large population center for weekend or day trip purposes is the small (16-acre) Katepwa provincial park which is approximately 60 miles from Regina.

Of course, this unfavorable distribution of provincial parks is largely a reflection of the unfavorable distribution of resource potential, although the more centrally located Last Mountain Lake area and the picturesque Qu'Appelle Valley, with its river and series of lakes, provide the resources which could be developed into public recreation facilities of a high standard. These opportunities have, however, been neglected in the past and now Mr. W. M. Baker, recreation consultant to the Saskatchewan government, who recently completed a study of recreation potential in southern Saskatchewan,[1/] warns that most of the choice land (with recreation potential) in these areas has been taken up already for private development. His recommendation is that the provincial government quickly proceed with the establishment of four provincial parks in the Qu'Appelle Valley, linked by a scenic highway.

The province is acting on some of Mr. Baker's recommendations and has established a new provincial park at Rowan's Ravine on Last Mountain Lake and will proceed to establish two more parks in the Qu'Appelle Valley next year, one on Buffalo Pound reservoir and the other on Pasqua

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1/ A Report on Outdoor Recreation in Southern Saskatchewan, November 1958.

Lake. Other provincial parks are being established at Pike Lake and Jackfish Lake.

In the long run the reservoir created behind the South Saskatchewan River Dam will help to offset the unfavorable distribution of recreation facilities. The 475 miles of shoreline created by this dam should provide a substantial recreation attraction within a convenient distance of Regina, Saskatoon, Swift Current, and Moose Jaw.

Limiting Factors

As a result of this unfavorable distribution of recreation facilities, the weekend tourist has provided little incentive for development of the type that would attract long-term vacationers from within the province and from outside. This situation has been a major factor limiting the tourist trade.

The failure or inability of the province to establish public recreation areas closer to the principal centers of population has contributed to the somewhat haphazard growth of private cottage developments on conveniently located rivers and lakes, with little provision for public reserves. Private developments have been undertaken on Last Mountain Lake and the western series of lakes in the Qu'Appelle Valley for Regina and Moose Jaw residents, at Pike Lake near the South Saskatchewan River for Saskatoon, and at Jackfish Lake for North Battleford. Prince Albert residents were placed in a different category by the fact that Prince Albert national park is so near. The significant point is that private developments of the type indicated tend to limit the use of the public recreation resources to those persons involved in the private development, to the exclusion of tourists.

There are certain limitations, also, to the recreational potential of the reservoir of the South Saskatchewan River Dam. The water stored in this reservoir is designed to serve four purposes: irrigation, water power, water supply for Regina and Moose Jaw, and recreation. Some of these claims are conflicting. It is possible to envision a situation in which the consumption of water for irrigation purposes would so lower the water level as to destroy the attractiveness of beach sites. This question is now the subject of a special study by Mr. W. M. Baker.

The recreation resources available in southern Saskatchewan, both developed and undeveloped, have important differences in quality. Swimming conditions, for instance, leave much to be desired, even in some of the provincial parks. Cypress Hills provincial park, with its other

excellent qualities, has unsatisfactory water levels in its two small lakes which made the construction of a swimming pool necessary. Throughout the Qu'Appelle Valley there has been a recurring algae problem which has unfavorably affected water conditions. On the other hand, in parks like Duck Mountain, Good Spirit, and Greenwater, the quality of water for swimming is good. Similarly, although most of the provincial parks have established golf courses, the scarcity of water has led to the utilization of sand greens which, while satisfactory to those accustomed to them, are not likely to rouse the enthusiasm of golfers who have been playing on grass greens. These two examples illustrate the fact that nature has played some part in discouraging the development of some of the obvious recreational facilities in southern Saskatchewan.

The major factor limiting utilization of Saskatchewan's recreation resources, particularly in the north, is the climate. The tourist season is restricted to approximately four months, so that operators of tourist facilities are faced with only a four-month revenue-earning period in which to recoup capital investments.

Basis for a Program of Expansion

Saskatchewan has experienced the same rapid growth in the tourist industry since World War II that has been experienced in practically all other parts of North America. While no figures are available as to the number of tourist-days spent in Saskatchewan, indicators presented in Table 84 demonstrate the upward trend. Of particular significance is the very rapid total expansion of resident tourist activities, as shown by a fourfold increase in big game licenses, and a threefold increase in game bird licenses. During the same period, nonresident license figures show a twofold increase in angling, a tenfold increase in game bird hunting, and a sixfold increase in big game hunting. The figures in Table 84 indicate that the principal development of Saskatchewan's game and fish resources has been the result of the demand of local residents.

Rapid growth in the tourist business in North America has led many provincial and state governments to conclude that research into the nature, size, and trends of the tourist industry might prove worthwhile. Some provinces or states are concerned primarily with data designed to measure success of past promotion efforts and future promotion techniques, others with public recreation facilities and facilities planning, and still others with highway planning.

In establishing a program for expansion of the tourist industry it is necessary to review (1) recreational resources of Saskatchewan in relation to competing resources in other areas, particularly the areas which might compete both for recreational expenditure by residents and nonresidents alike; (2) the outlook for tourism in North America; and (3) economic criteria which may be used to aid program decisions.

Competitive Tourist Resources

As mentioned above, Saskatchewan's major tourist attractions are hunting and fishing, which in the northern part are coupled with a "frontier" environment particularly attractive to most hunters and fishermen. The province also has attractive areas of forests and lakes for camping, hiking, and water sports, which, however, are not unique. Such resources are important in attracting residents but will not be a prime attraction for nonresidents.

Apart from the natural resources, one of the principal attractions of Saskatchewan lies in facilities which exploit the uniqueness of the area. In the last few years there have been a number of such developments. Quite an outstanding example is the provincial Museum of Natural History, opened in 1955. This museum was designed for the display of Saskatchewan wild life amid natural settings and, as such, is representative of the province. Similarly, the Western Development Museum in Saskatoon, with branches in North Battleford and Yorkton, has gathered together the farm machinery used in the pioneer days of the province and thus is a unique expression of the Saskatchewan story. In addition, there is particular tourist interest in the Royal Canadian Mounted Police training center and museum in Regina. The South Saskatchewan Dam is likely to be a tourist attraction.

A survey recently completed by Business Planning Associates of Toronto[1/] showed that of time spent by Saskatchewan tourists traveling outside the province, 40 percent was spent outside Canada (mainly in the United States), and approximately 50 percent in the other three western provinces. Figures presented in this study also suggest that for Canada as a whole approximately 6 percent of the travel by Canadians is within the province of residence. Over-all, the provincial residents are probably the major source of revenue to the tourist industry in Saskatchewan;

1/ Canadian Travel Industry Survey, Business Planning Associates, December 1958.

thus, any program for development should take this factor into consideration. However, the general trend is likely to be a decline in this sector, as Saskatchewan's per capita income increases and more leisure time is available for longer trips. Of course, this trend in other parts of North America will be to the advantage of the Saskatchewan tourist industry.

The areas outside the province which compete for Saskatchewan's resident tourists are obviously those that also would compete for the nonresidents. Alberta, British Columbia, and some parts of the United States place Saskatchewan at a competitive disadvantage in scenic attractions, such as heavy timber areas, mountains, large cities, and famous resorts. However, in other attractions, such as fishing and hunting, Saskatchewan is at least the equal of the states in the U.S. Midwest and other provinces in the Prairie region, and in many respects, better.

The Outlook for Tourism in North America

It is reasonable to assume that the tourists in Saskatchewan will be almost entirely from Canada and the United States. Basic in determining the future travel pattern of the North American public are forecasts of population, gross national product, disposable personal income, consumer expenditures, and leisure time resulting from a shorter work week, longer vacations, earlier retirement, and greater life expectancy. The U.S. Bureau of the Census estimated that by 1975 the population of the United States will increase to 235 million.[1/] Canada is estimated to have a population of 27 million by that time. Over-all growth in the two countries is 4.3 million per year between 1959 and 1975. Gross national product in 1957 dollars has been forecast to reach $826 billion in the United States and $67 billion in Canada by 1975, or an annual increase in the two countries of $24.8 billion.

The increase in Canadian per capita income was shown in Table 20. Growth in average U.S. purchasing power from 1930 to 1960 is as follows:

1/ U.S. Bureau of the Census, Current Population Report, Population Estimates, Series p-25 189, November 1958.

Year	Disposable Income[1/] (1950 dollars)	
	Per Capita	Per Household
1930	$ 890	$3,650
1940	1,000	3,830
1950	1,360	4,730
1960	1,440	5,010

In less than a generation, per capita income (in real terms) has increased by more than 50 percent; although the rate of increase is showing signs of lessening, there seems little prospect of a leveling-off in the immediate future.

Of interest also is the growing number of households moving into higher income brackets. For example, in the United States families receiving from $3,000 to $5,000 represented 20 percent of all families in 1935, but in 1944, represented close to 33.3 percent. In the same period, U.S. families receiving $5,000 to $10,000 rose from 8.5 percent of all families to over 25 percent; but families receiving less than $3,000 income dropped from 70 percent of the total in 1935 to 36.5 percent in 1944.[2/]

A continuation of this trend in both Canada and the United States is forecast by most observers. Projections for the United States are as follows:

1/ America's Needs and Resources, Twentieth Century Fund, 1955, J. Frederick Dewhurst and Associates, p. 92.

2/ Ibid., p. 92. (Using 1950 prices.)

DISTRIBUTION OF SPENDING UNITS
BY TOTAL MONEY INCOME IN 1950 DOLLARS
Percent of Units by Bracket

Income Bracket	1947	1950	1953	1956	1962	1968
Under $2,000	34.2%	30.0%	25.5%	24.0%	21.4%	16.5%
$2,000-$3,999	39.3	38.0	34.5	29.2	25.4	21.1
$4,000-$5,999	16.5	21.0	24.5	25.0	28.7	33.4
$6,000-$7,499	4.0	5.0	7.5	9.8	11.3	12.8
$7,500 and Over	6.0	6.0	8.0	12.0	13.2	16.2
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bonnar Brown and Carol Van Alstyne, Family Income Patterns 1947-1968, Stanford Research Institute, Menlo Park, California, May 1959, Table IV, p. 7.

Increasing population and increasing per capita real wealth are no more important to the tourist industry than is the trend toward shorter hours of work. The growth in leisure time in the United States is illustrated by the following figures:[1/]

Year	Average Number of Hours Worked per Week in U.S.
1920	47.4
1930	42.1
1940	38.1
1950	40.5
1955	40.7
1960	39.0
1980	35.4

It is expected that trends in Canada will closely parallel those in the United States. In addition to the short work week, such trends as the increase in laborsaving devices in the home (automatic dishwashers,

1/ Tide, April 21, 1956, p. 33.

power mowers), packaged foods, and longer vacations for ever-larger numbers of workers,[1/] lend strength to the projections of a leisure-oriented era ahead. An example of these trends is the increased paid vacation time in Canadian manufacturing, as shown in Table 85.

Another trend affecting the tourist industry is in the type of accommodations desired. More people are taking pleasure trips, but the average travel expenditure per person, measured in absolute terms, is decreasing. The wealthy few are less significant in the total travel picture than formerly. Also, the effects of increasingly high, graduated personal income taxes tend to limit the numbers who can afford the utmost in luxury and who require the more formal types of accommodations.

There is doubtless a ceiling upon the proportion of disposable income that can be spent for recreation, and there is a limit to the sacrifices any family will make during the year to finance a seasonal vacation trip. When these limits are reached, future expansion of the total travel market must depend upon a continued rise in population and/or disposable income per person. The over-all limits of this market are apparent from its sensitivity to slight changes in the economic barometer. Finally, it is apparent that individuals have many choices for their recreation dollar, and there will be increasing competition among the various vacation or resort areas for that portion of disposable income which families set aside for vacation travel.

It is evident that no absolute ceiling can be placed on the share of this discretionary spending that is available for travel. Individual expenditures above the basic necessities are highly responsive to such factors as available leisure time, educational levels, transportation facilities, advertising and selling techniques, and the extent to which other individual wants have been satisfied. The travel potential, then, is dependent on many factors other than disposable income. The conclusion resulting from the interplay of all pertinent factors is that tourism will continue to increase, and Saskatchewan will enjoy a share of this increase.

1/ Which in the case of "white collar" workers have increased from the prewar two-week period to three- and four-week periods and extended weekends.

Table 85

PERCENT OF EMPLOYEES IN ALL MANUFACTURING PLANTS AFFECTED BY PREVAILING STANDARDS OF VACATIONS WITH PAY 1949-1958

Prevailing Standards	Employees in All Manufacturing Plants (percent)		
	1949	1953	1958
At Least One Week with Pay	99.0%	99.3%	--%[1]
Two Weeks with Pay	81.0	92.6	95.4
After: 1 year or less	10.2	14.9	22.9
2 years	6.6	9.6	13.8
3 years	6.4	22.5	28.3
5 years	54.8	40.4	27.8
Other	3.0	5.2	2.6
Three Weeks with Pay	30.4	50.8	72.6
After: 15 years or less[2]	4.2	28.8	64.8
More than 15 years	26.2	32.0	7.8
Four Weeks with Pay	0.5	4.0	14.6
After: 24 years	0.5	3.3	10.8
Other	--	0.7	3.8

1/ Not stated, practically universal.
2/ Predominantly 15 years.

Sources: Labour Gazette, October 1953. Working Conditions in Canada, 1958, Department of Labour.

Economic Criteria

Efforts to place quantitative measures on recreational values have been common since recreation was recognized as a public responsibility. The problem faced by economists and planners is the lack of appropriate economic tools with which to measure benefits. Demand on existing recreational facilities in many parts of the United States and Canada has far exceeded capacity, and, as a consequence, the need for additional capacity has been so evident that economic evaluation has appeared unnecessary.

The principal method of estimating dollar values for recreation for evaluation of expenditures for promotion and development of tourist facilities is based on expenditures by users of the recreation facilities. Some of these estimates are presented in Table 86. One approach, based on travel costs, was developed by Professor Hotelling [1/] for the purpose of measuring benefits to users of recreational facilities such as dams and parks provided by public agencies. In a specific application of this approach by Trice and Wood,[2/] a figure of $2 per tourist-day was derived as being an amount the average tourist would be prepared to pay for recreation at the proposed Feather River Dam in California, above actual expenditures. In Saskatchewan, a study carried out by the Department of Natural Resources showed that, on the basis of expenditures, fish taken by tourists were worth approximately $6 per pound.

In using figures such as those quoted above, it is important not to overlook possible secondary benefits; i.e., province-wide benefits which are above the purely personal enjoyment of those engaging in the recreation. Included would be such province-wide values as improved mental and physical health of citizens, reduced delinquency, and similar values which might be reflected in lower costs for government institutions of restraint and health. Recreational facilities are important in improving living conditions and thus aiding in attraction of industry to the province. Also important are expenditures for goods and services which, when made by nonresidents (or residents who would otherwise have gone outside the province), enhance the provincial economy and increase the tax base.

1/ Associate Director, Institute of Statistics, University of North Carolina, Chapel Hill, N.C.

2/ Journal of Land Economics, Volume 34, No. 3, August 1958.

Table 86

ESTIMATES OF TOURIST AND SPORTSMEN EXPENDITURES
IN CANADA AND THE UNITED STATES

	Average per Day Expenditures	
	Dollars of Year Given	1957 Dollars[1/]
Hunters in United States (arith. avg.) 1955	$ 5.52	$ 5.81
Fishermen in the United States (arith. avg.) 1955	4.82	5.07
Angler Expenditures, 1956	7.64	7.85
Montana Tourist, 1955	7.72	8.13
Texas Tourist, 1955	7.53	7.92
South Dakota, 1954	6.85	7.33
Kansas, 1952	3.89	4.45
United States Auto Tourists in Canada, 1957	7.82	7.82
United States Tourists in Manitoba, 1956	9.31	9.50
Canadians in the United States, 1958	11.06	10.52

1/ Expenditures were deflated to 1957 dollars by use of implicit price deflators for services of the U.S. Dept. of Commerce.

Sources: Land Economics, August 1958. Canadian Travel Industry Survey, December 1958, Business Planning Associates.

Essentials of a Program of Action

The foregoing descriptions of recreational resources and possible criteria upon which any development might be evaluated provide the background for a tourist development program.

The first step in an action program is usually the assembling of all facts and ideas pertinent to the problem.

In general, data compiled by governmental agencies regarding the tourist trade have tended to serve their purposes: States and provinces that have been interested in discovering the success of their promotional and advertising campaigns have gained insights for future programming. Provinces which have had research done to aid the industry in future planning have obtained information enabling the people concerned with tourism to appraise their future needs. A similar result has been achieved in the highway-use studies.[1/]

In view of the potential usefulness of certain statistical information relating to the tourist industry, it is suggested that the Department of Travel and Information give consideration to the collection of such data. Visitor counts at provincial parks were started in 1959. Highway counts and surveys designed to isolate specific characteristics of people using the tourist facilities might also prove useful.

In any detailed study of the characteristics of the tourist industry, a joint project carried out by the provincial governments in cooperation with the dominion government would be more useful than a study undertaken by a single province. Such a study has the advantage that statistics collected would be much more meaningful. For example, there is no doubt that many U.S. tourists will probably visit more than one province, and many U.S. tourists who visit Saskatchewan enter border points in other provinces. Thus, apart from the difficulty of accumulating significant data on tourist entries and other information purely on a provincial basis, these provinces have a common interest in understanding the requirements and characteristics of U.S. tourists.

Furthermore, it has been shown for the four western provinces that the great majority of Canadians who visit one western province are from

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1/ Robert S. Freidman, How States Find Out about Their Tourist Trade, Bureau of Governmental Research, College of Business and Public Administration, University of Maryland, 1954.

one of the other three. Therefore, information about the preferences of the people in one province would be useful not only to the province studied but to the other provinces as well.

While such a study could be organized in a number of different ways, a possible approach would be the establishment of a continuing committee (of appropriate representatives of federal and provincial departments and private tourist agencies), which would engage the necessary recreation consultants and technical staff.

The Department of Travel and Information could continue to take an active interest in new road programs which would open up new tourist possibilities, and in the improvement of roads providing access to existing tourist facilities. Improved transportation services, to Saskatchewan and within the province, warrant continuing attention. To keep up with the increasing tourist business, consideration might be given to the financial and regulatory requirements for additional facilities, particularly the construction of motels around major cities. In order to stimulate investment in such facilities, consideration could be given to the possibility of providing government loans to certain well-qualified operators of tourist facilities.

Any program designed to further exploit the historical and natural conditions peculiar to Saskatchewan would be worthy of favorable consideration.

A promotional program that includes a proper, well-placed distribution of promotional material is essential. An example is the state of Utah's Tourist and Publicity Council. This agency has a clever program for promotion and advertising, which grew from the example of other states and from monetary necessity. From every letter received from a potential tourist, the council lists "the name, address, how traveling, and what interested in," and periodically mails the list to 65 agencies, organizations, and individuals in the state. The recipients of the list may then send promotional material related to their particular area and/or send a personal letter describing points of interest and accessible scenic areas. The council also provides movies of Utah's scenic areas.

Other publicity media which could be used by Saskatchewan are lectures and magazine articles prepared especially for distant audiences of potential tourists.

The following specific suggestions regarding promotion are offered for consideration for possible implementation in Saskatchewan:

1. The "Wheat Province" designation on provincial automobile license plates could be replaced with some other appropriate promotional slogan.

2. Publicity emphasizing the good roads of Saskatchewan could erase the time-worn reputation for road deficiencies, and efforts could be made to encourage the use of other roads in addition to the Trans-Canada Highway. This might be done through publicizing the attractions of various Saskatchewan communities and the excellent roads leading to them. If through-tourists made stops in some of these communities, they would stay longer in the province.

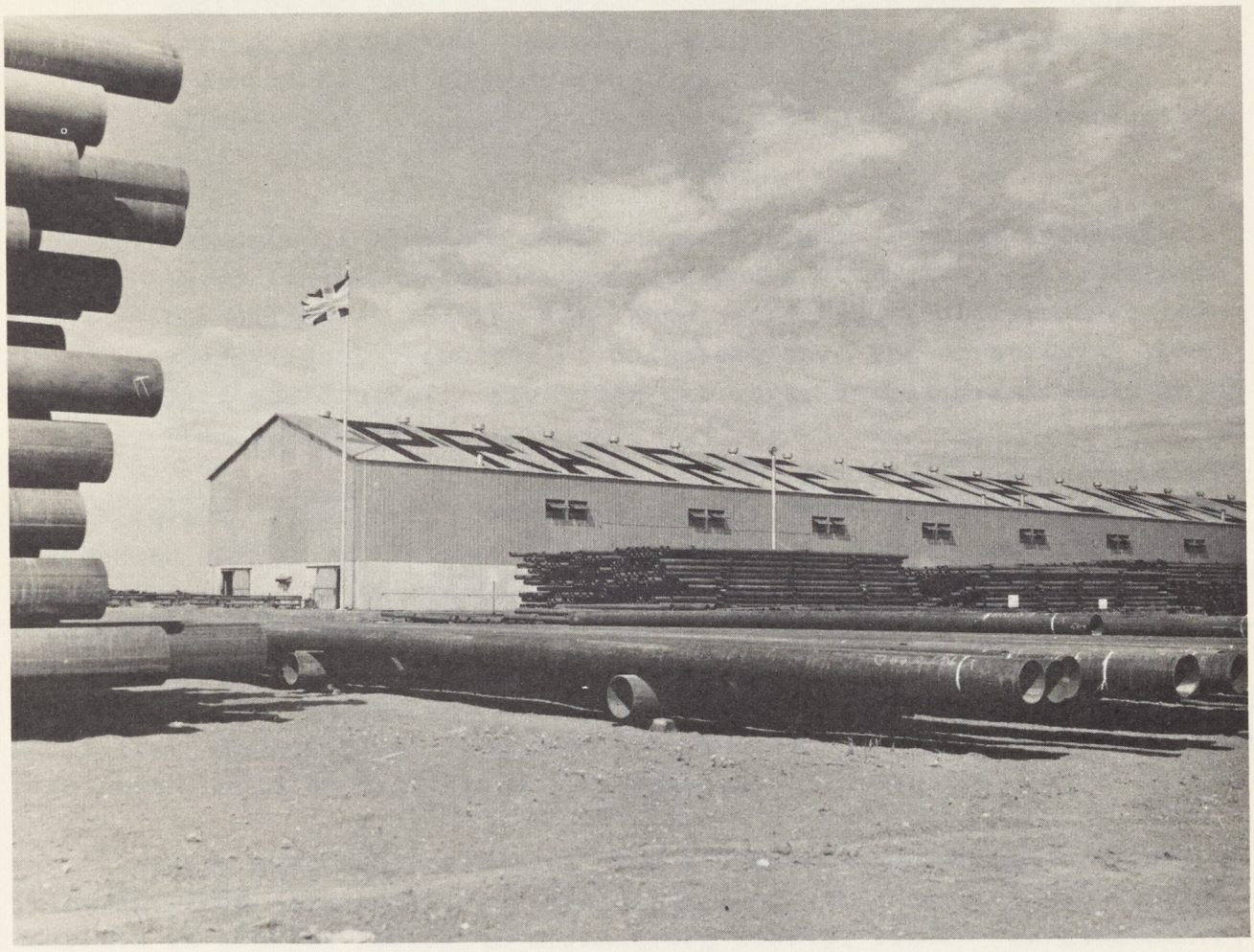
3. Promotional agencies might negotiate with leading calendar firms in the United States to produce attractive illustrations for calendars showing the lakes, streams, wildlife, and other recreational resources of Saskatchewan. The advertising company would benefit from free art work; Saskatchewan would enjoy free publicity.

A further increase in tourist trade for Saskatchewan will depend on a combined effort on the part of every resident, agency, and official in the province. It will also depend on the personal treatment tourists receive from Saskatchewan people; the availability of adequate and pleasant accommodations at fair prices; the physical appearance of Saskatchewan communities, homes, and farms; the conditions of highways; and proper publicity. Saskatchewan is generally known as a friendly province. This reputation could be maintained and improved.

Charging reasonable and equitable prices for accommodations, entertainment, food, souvenirs, and all other goods and services utilized by tourists is a major factor in stimulating tourist trade. An attractive, pleasant environment is another important aspect in influencing tourist trade. Clean, well-maintained business communities; homes properly painted and landscaped; and orderly, well-developed farms can do much to add to the attractiveness of the province.

Section VIII

MARKET-ORIENTED INDUSTRIES, INCLUDING TRADE AND SERVICES



Prairie Pipe Manufacturing Company's Plant in Regina

SASK. GOVT. PHOTO

Section VIII

MARKET-ORIENTED INDUSTRIES, INCLUDING TRADE AND SERVICES

An investigation into the industrial development opportunities of an area logically includes a general analysis of the area in terms of basic locational factors. Such an analysis eliminates many industrial possibilities for which the area is unsuited, identifies economic characteristics unique to the area, and suggests certain industries that may have economic potential in the area. These "candidate industries" are then further analyzed and their economic feasibility appraised. In analyzing the various candidate industries, though the same factors are used, the emphasis is often extremely different. Availability of raw materials may be a dominant factor in one instance, proximity to market in another, or perhaps the existing national locational patterns of an established industry in still another.

Factors Favoring Location of Industry in Saskatchewan

From the general analysis of Saskatchewan, it appears that the province has considerable potential as a location for new industries, along with some limitations. The potential is indicated by an abundance of certain natural resources; availability of power, fuel, water, and financial services; labor; and industrial plant sites. Similarly, Saskatchewan's tax structure and laws and regulations, as compared with other areas, are not unfavorable. Important also are the living conditions characteristic of the area, the attitude of communities toward new industry, and the program of industrial development sponsored by government and industry.

While these basic characteristics are attributes that are attractive to industry and are of significant economic importance, many other western areas enjoy similar favorable characteristics. Thus Saskatchewan as a location for industry will have to compete with other areas on an economic basis. Ordinarily, other considerations being equal, industrial plants are established in the area of optimum economic feasibility.

The Major Limiting Factor

Although Regina, Saskatoon, and other cities of Saskatchewan are centrally located in the Prairie market, this market has grown substantially in recent years, and all indications point to continued growth,

the fact remains that total population served is not as large as that served from many other major industrial cities. It is fundamental to distribution economics that the most efficient location is in or near the major segment of the market. In Canada, this often means a large city in the east, or the largest midwestern city, or perhaps the largest city on the West Coast. Saskatchewan enjoys definite locational advantages in the Midwest market, but these advantages will not prove very attractive to market-oriented industries until population increases and the influence of improved technology is felt.

Potential "Footloose" Industries

In contrast with industries that must be located near basic raw materials or with those that must be close to markets are the "footloose" industries. These are industries characterized by low-weight, high-value products generally involving small quantities of raw materials but considerable quantities of labor and processing. With these characteristics, the expense involved in shipping either raw materials, finished products, or both is a small part of the value of the product; thus distribution costs are relatively insignificant to total costs. Examples are the watch-manufacturing industry, the fountain pen industry, and precision instruments industries. To a lesser extent, the manufacture of clothing is a footloose industry, except for the influence of fashion and the need to be close to centers of fashion.

These footloose industries are diverse and difficult to identify. By their very nature they cannot be attracted on the basis of economic advantage and thus are not easily moved from traditional locations. With few exceptions, they are the target of nearly every city which has an industrial development program, and competition among communities is intense in this respect.

These industries tend to locate in areas where qualified labor is available and where social, educational, and cultural characteristics are most desirable. In most instances, these favorable factors also provide favorable market factors which, although not of major importance, are nonetheless an additional attraction to such industries. In other words, obtaining establishment of footloose industries in smaller, more isolated cities is difficult in competition with large cities where universities and a variety of recreational facilities, convention halls, and other attractive social features are established.

Some of the industries discussed in relation to demand for products in Saskatchewan are in the category of footloose industries. As such,

the products of those industries could be distributed to various areas in the Prairie market but also could be manufactured anywhere. Accordingly, for purpose of the discussion, consideration of this category of industry is included in market-oriented industries.

Foundation for Market-Oriented Industries

The growth of a market can be brought about by an increase in the number of persons who buy in that market, either because of natural growth of population or an influx of people into the market area, and by increased purchasing power of these people. Also, larger amounts and additional types of products may be bought merely because of a growing wish to have the product, entirely apart from other considerations. Before investigating in detail the opportunities for initiating or expanding market-oriented industries, some general comments are made about each of these forces in the Saskatchewan economy, beginning with the geographical area of the market.

Population Growth

Neglecting possible competitive elements, the Prairie market area, for most manufactured products, is bounded by the Rocky Mountains on the west, the barren stretches of the Laurentian shield in Ontario on the east, the Arctic on the north, and the United States border on the south. Beyond the eastern and western boundaries of this market region are comparatively large centers of population which have their own manufacturing industries. Once an industry became established in that area, it was cheaper to produce requirements for the Prairie market in the original plants than to build separate plants within the Prairie market area.

Since it is much cheaper, with the Canadian freight structure, to transport raw materials than fabricated goods, industry is clustered near the large centers of population, particularly in the Great Lakes-St. Lawrence region of Ontario and Quebec. This tendency has been accentuated by the location of the sources of most raw materials and by the natural trade routes of the country. The initial discoveries of most industrial raw materials have been in the region about the Great Lakes-St. Lawrence valley, and, historically, the most important trade route has been through that same valley.

Two kinds of changes are causing a reversal of the trend for industry in eastern Canada to serve the Prairie market. As transportation costs have risen, it has become increasingly profitable to carry raw

materials to Prairie markets and to fabricate there. Similarly, as the Prairie population has grown, it has provided an increasing market to support local industry. The combination of increasing population and increasing freight tariffs is turning the Prairie market from an appendage of the St. Lawrence (and secondly, British Columbia) area into an independent market area.

In Saskatchewan, however, and to a lesser extent in Alberta and Manitoba, population is the one variable that has not yet increased at the rate one might expect. As has been noted, this is because two conflicting tendencies have been at work in Saskatchewan: increasing employment in industry, but not enough increase to overcome the drain on population as families have left the farm, and the area. There is reason to believe that the population of the province will now grow more rapidly. The movement from the farm was closely related to the utilization of mechanical aids. It seems likely that the force of increased mechanization will be gradually less effective as the years pass, and that the farm population will become relatively stable. (This, of course, assumes that there will be no revolutionary changes in farm technology.) Furthermore, the natural resources of the province have not yet been fully exploited. The non-agricultural population should, therefore, continue to increase as these resources are developed.

Growing Desire for a Product

Increased desire for a product is not properly the subject matter of this report, since it springs either from the technical bases of the invention or the improvement of the product, or from the psychological and social bases of such things as fashion and advertising. Accordingly, the only further mention made of this element of increasing markets is that increased income plus technological advances, such as rural electrification, have substantially increased the total Prairie market in recent years.

Purchasing Power

Closely related to discussions of the effect of freight rates and population is the effect of price. As price decreases, the tendency to buy a product increases. Reducing manufacturers' costs may permit selling the goods at a reduced price. In this way, a secondary increase in the market may be initiated.

Similar to reduced prices are increased incomes. In Section III of this report, it was indicated that income in the province has been growing steadily. Since a considerable portion of this increase has been due to the expansion of nonagricultural incomes, income in the province, and especially retail trade, has not suffered the fluctuations that would have occurred in a purely agricultural economy. The history of incomes therefore encourages the expansion of manufacturing activities.

The rate of increase in some industries in Saskatchewan has been phenomenal during the last few years. This new productive capacity has been generated by increased demand or increased income of the present population and by needs of the new primary industries. The relation of the primary industries to the present growth of the secondary industries is illustrated by examining some of the main determinants of three outstanding industries that have been established in the last few years:

Pipe - A pipe mill has been established to furnish pipe to the oil fields and for pipeline use.

Steel - A steel mill has been established, in part, to provide skelp for the new pipe mill and for a pipe mill in Alberta, and to provide plate for various construction projects in the Prairie Provinces.

Cement - The new cement plant provides cement of the type used in the oil fields and manufactures alkali-resistant cement to meet local construction conditions.

These relationships exist in many other industry complexes. It is anticipated, therefore, that the population--and markets--of Saskatchewan will continue to grow and that the absolute rate of growth will increase in future years.

Trade and Services

Closely related to the growth in primary and secondary industries are retail and wholesale trades and various service industries. These business activities provide new opportunities for enterprises in a growth economy.

The growth of population, such as that experienced in Saskatchewan's cities in recent years, is usually not paralleled by a corresponding numerical growth in retail, wholesale, and service trades establishments--many of the increased needs incident to the growth in population are

absorbed by established firms. Nevertheless, more population means more opportunities in retail and wholesale establishments and in service trades. Greater concentration of population, especially if accompanied by a higher standard of living, usually calls for the development of new types of services.

Basic and Service Industries, and the "Circular" Effect

As previously stated, growth expectations in Saskatchewan are based primarily upon the continued development of natural resources, plus the related development of secondary industries and the development of local and regional trade and service industries. The development of these interrelated industries provides the base for and the motivation of additional development, under circumstances of cause and effect which might be referred to as the "circular" effect.

Studies of experience in various communities in both Canada and the United States show that service employment resulting from basic[1/] employment varies from little or no additional employment in unique circumstances to as much as double or triple the basic employment. Established ratios suggest a variance of 0.5 to 2.5. Typically, the larger the city, the greater the ratio of service to basic jobs. Furthermore, there is a time lag between the establishment of the basic jobs and the consequent development of service jobs.

The transitional and continuing results of these circumstances are that as one basic industry is established, the need for additional service industries is created. As these industries are established, the need for other secondary or service industries is created. The people associated with these industries may then comprise a market large enough to justify exploitation of an additional natural resource, or may provide the initiative or technical skills for establishing another basic or secondary industry. These developments in turn result in the need for additional service industries--and the cause and effect influences are repeated. Thus, industry increases in a manner that might be diagrammatically described by a series of circles, beginning with one and constantly adding others that are slightly larger than the preceding ones.

1/ As defined in Section VII.

There is also another concept of interest and possible application to the Saskatchewan economy, which modifies the "circular" theory by emphasizing a time lag between spurts of industrial development. According to this concept, industrial development occurs in distinct steps or phases. Each step is a plateau of development based upon the addition to the economy of one or more newly developed basic industries plus related service industries. Each step or plateau may be several years in length before additional industries are established which lead to ascension to the next plateau of industrial development.

These types of growth have been experienced by Saskatchewan, and will continue to be experienced in the future. This simply means that an industry not feasible today may well be feasible tomorrow. These growth influences have been kept in mind while developing the following lists and discussions of possible candidate industries for establishment in Saskatchewan.

Prospective Industrial and Commercial Opportunities

Commodity Imports and Related Industrial Developments

One method of identifying industrial and commercial opportunities is by investigating the quantities and types of commodities that are imported into an area. The latest freight statistics available at the time of this report were those of 1957. According to these, the commodities of which Saskatchewan appears to have had the greatest net in-flow, on a tonnage basis, are as follows:

Stone and Rock - broken, ground, and crushed
Lumber - shingles and lath
Veneer - plywood and builtup wood
Lubricating Oils and Greases
Iron and Steel - bar, rod, and slab
Iron and Steel - nails and wire (woven and unwoven)
Cast Iron Pipe and Fittings
Cement - natural and Portland
Wallboard
Liquors - alcoholic
Soap and Cleaning and Washing Compounds
Containers - fiberboard and paperboard (knocked down)

It is interesting to note that during the last two years, announcements have been made of the establishment or expansion of firms which manufacture many of these articles. However, it does not necessarily

follow that these new or expanded industries are large enough to supply the whole market, either in the province or in the Prairie region. It is true that industrial expansion has been proceeding at a rapid pace to fill in the apparent gaps in the provincial economy.

The Department of Co-operation and Co-operative Development has prepared a detailed list of selected imports into the Prairie Provinces. This list is presented in Appendix A, Table 93. A list of commodities of which Saskatchewan and the Prairie Provinces appear to be net exporters and net importers is presented in Appendix A, Table 92.

Ratio Analysis

Another method of identifying prospective opportunities appropriate for further investigation is to determine those industries in which employment and net value of production in Saskatchewan bears a lower relation to those of Canada than does the population of Saskatchewan to that of Canada. This ratio approach assumes that the consumption patterns are proportionate to population patterns. Thus, the list of industries developed from this methodology is comprised of those industries which are not as active in Saskatchewan as Saskatchewan's proportion of Canadian population would indicate.

The candidate industries thus determined are enumerated in Table 87. Brief descriptions of selected industries are presented as follows:

Rubber Goods

The rubber industry is highly concentrated in Ontario. To a very large extent, this is because the rubber tire industry has been located close to the automobile industry, and because the large markets for other rubber products are also in eastern Canada. However, it is quite possible that manufacturers of such products as tires, rubber heels, rubber extrusions, and rubber-on-metal moldings might find it profitable to produce locally for the Prairie market. A tire recapping center could take advantage of the local supply of used tires. Any of these would, of course, be still more susceptible of establishment should a synthetic rubber plant be established in the province.

Table 87

INDUSTRIAL POSSIBILITIES SELECTED BY "RATIO ANALYSIS"

Abrasives, artificial
Adhesives
Agricultural implements
Aluminum products
Asbestos products

Batteries
Biscuits
Boat building
Brass and copper products
Breakfast foods
Brushes and mops

Caskets and coffins
Cheese, process
Chemicals and allied products
Clothing, women's and children's
Coal tar distillation
Cordage, rope and twine

Electrical apparatus and supplies

Feeds, prepared
Fertilizers
Fish processing
Flooring, hardwood
Footwear
Furniture, metal
Furniture, upholstered
Furniture, wooden

Gloves and mittens
Gypsum products

Ice, artificial
Iron and steel products

Leather industries, other
Leather tanning
Liquors, distilled

Macaroni and kindred products
Machinery, industrial
Medicinal and pharmaceutical preparations
Milk products, concentrated

Nonferrous metal products
Nonmetallic mineral products

Oilcloth, linoleum, and other coated fabrics

Paints, varnishes, and lacquers
Plastic products

Rubber goods, including footwear

Sawmills, sash, door, and planing mills
Sheet metal products
Soaps, washing compounds, etc.
Sugar refining

Telecommunication equipment
Textiles, synthetic
Transportation equipment

Veneers and plywoods

Wire and wire goods

Cordage, Rope, and Twine

Rope and cord are used extensively in farm, construction, and mining operations. Manufacture of these goods has been concentrated in the east and in British Columbia. There seems to be no reason why the Prairie Provinces could not absorb the output of an average-sized establishment manufacturing such products as binder twine and cord.

Aluminum Products

The manufacture of welded aluminum tubing could be a profitable operation. The Prairie Provinces are a big market for aluminum tubing for irrigation purposes. The same tubing is said to have extremely desirable characteristics of portability and availability for fighting forest fires. The Canadian market is presently being supplied from eastern Canada. Freight differentials between the costs of shipping sheets and fabricated tubes might be sufficient to warrant a shift in the location of the industry.

Aluminum extrusions are used for such products as sections for window frames and seamless tubing (used, for example, to make television antennas), and structural shapes. The extrusion industry has been concentrated in the east. The feasibility of an operation consisting initially of a light press and necessary ancillary equipment should be thoroughly investigated.

Asbestos Cement Products

Manufacture of most nonmetallic mineral products depends on the presence of the raw material. One group of products that is not produced in the Prairie Provinces at the present time is asbestos cement products. Asbestos cement pipe, conduit, and sheet have many uses. High-pressure pipe of asbestos cement is particularly useful for transporting water that attacks other materials, such as certain industrial wastes. There is little doubt that by the time a plant for this material could be erected, there would be a market for its output.

Electrical Apparatus and Supplies

Recently a company has begun operations in Saskatchewan manufacturing electric power transformers. The economics of beginning production of related items, such as switchgear and service boxes, could be

examined very carefully. Also, the production of electrical fence devices could be a natural and profitable adjunct to a firm making electrical equipment involving small transformer windings.

Assembly lines for small radios need little capital investment. (The chief investment is for soldering irons and a few jigs.) Such a plant can operate in a small space and might afford countercyclical employment for a few people.

Cleaning Compounds

Soaps and washing compounds also form a reasonable field in which to initiate activity. There seems no reason why Saskatchewan should not have an increased share in this industry, which has a net value of production of over $60 million for Canada.

A Review of the Standard Industrial Classifications

Another method of obtaining indications of prospective industry possibilities is through consideration of the many industry categories comprising the United States Standard Industrial Classification Manual. The results of this consideration are predicated upon reasonable judgment by the research staff, after extensive study of Saskatchewan's economic reports and statistics, plus personal interviews and field work in the province. A list of industrial opportunities such as this is only suggestive, but is helpful in identifying the areas of industry most logical for further analysis.

Table 88 presents the list resulting from this method of evaluation.

The industries listed are classified in three categories based on current markets and level of growth: (1) prospective industries--those judged susceptible of establishment or expansion; (2) those industries which might have some possibility of establishment or expansion; and (3) those which appear to have not enough economic justification for establishment in the area to warrant consideration at this time. This list should not be considered static, but will change with growth of markets, new raw materials, new basic industries, and changes in general economic conditions.

Table 88

INDUSTRIAL POSSIBILITIES FOR SASKATCHEWAN
A REVIEW OF THE STANDARD INDUSTRIAL CLASSIFICATION MANUAL

S.I.C. Group No.	Name	Degree of Possible Suitability for Saskatchewan		
		1 1/	2 2/	3 3/
Major Group 19	Ordnance & Accessories			
191	Guns, howitzers, mortars, & related equipment			X
192	Ammunition (except small arms)			X
193	Tanks & tank components			X
194	Sighting & fire-control equipment		X	
195	Small arms		X	
196	Small arms ammunition	X		
199	Ordnance & accessories (not elsewhere classified)		X	
Major Group 20	Food & Kindred Products			
201	Meat products		X	
202	Dairy products		X	
203	Canning & preserving fruits, vegetables, & sea foods		X	
204	Grain-mill products		X	
205	Bakery products		X	
206	Sugar			X
207	Confectionery & related products		X	
208	Beverage industries		X	
209	Miscellaneous food preparations & kindred products		X	
Major Group 21	Tobacco Manufacturers			
211	Cigarettes			X
212	Cigars			X
213	Tobacco (chewing & smoking) & snuff			X
214	Tobacco stemming & redrying			X
Major Group 22	Textile Mill Products			
221	Scouring & combing plants			X
222	Yarn & thread mills (cotton, wool, silk, & synthetic fiber)			X
223	Broad-woven fabric mills (cotton, wool, silk, & synthetic fiber)			X
224	Narrow fabrics & other smallwares mills (cotton, wool, silk, & synthetic fiber)			X
225	Knitting mills			X
226	Dyeing & finishing textiles (except knit goods)			X
227	Carpets, rugs, & other floor coverings			X
228	Hats (except cloth & millinery)	X		
229	Miscellaneous textile goods			X
Major Group 23	Apparel & Other Finished Products Made From Fabrics & Similar Materials			
231	Men's, youths', & boys' suits, coats, & overcoats		X	
232	Men's, youths', & boys' furnishings, work clothing, & allied garments	X		
233	Women's & misses' outerwear	X		
234	Women's, misses', children's, & infants' undergarments		X	
235	Millinery		X	
236	Children's & infants' outerwear	X		
237	Fur goods		X	
238	Miscellaneous apparel & accessories		X	
239	Miscellaneous fabricated textile products		X	

1/ Prospective.
2/ Possible.
3/ Does not appear to warrant consideration at this time.

Table 88 (Cont.)

S.I.C. Group No.	Name	Degree of Possible Suitability for Saskatchewan		
		1	2	3
Major Group 24	Lumber & Wood Products (except furniture)			
241	Logging camps & logging contractors			X
242	Sawmills & planing mills		X	
243	Millwork, plywood, & prefabricated structural wood products	X		
244	Wooden containers			X
249	Miscellaneous wood products		X	
Major Group 25	Furniture & Fixtures			
251	Household furniture	X		
252	Office furniture		X	
253	Public-building & professional furniture		X	
254	Partitions, shelving, lockers, & office & store fixtures	X		
256	Window & door screens, shades, & venetian blinds		X	
259	Miscellaneous furniture & fixtures		X	
Major Group 26	Paper & Allied Products			
261	Pulp, paper, & paperboard mills		X	
264	Paper coating & glazing			X
265	Envelopes		X	
266	Paper bags		X	
267	Paperboard containers & boxes			X
269	Pulp goods & miscellaneous converted paper products			X
Major Group 27	Printing, Publishing, & Allied Industries			
271	Newspapers			X
272	Periodicals			X
273	Books			X
274	Miscellaneous publishing			X
275	Commercial printing			X
276	Lithographing			X
277	Greeting cards		X	
278	Bookbinding & related industries			X
279	Service industries for the printing trade			X
Major Group 28	Chemicals & Allied Products			
281	Industrial inorganic chemicals		X	
282	Industrial organic chemicals		X	
283	Drugs & medicines		X	
284	Soap & glycerin, cleaning & polishing preparations, & sulfonated oils and assistants	X		
285	Paints, varnishes, lacquers, japans, & enamels; inorganic color pigments, whiting, & wood fillers	X		
286	Gum & wood chemicals		X	
287	Fertilizers		X	
289	Miscellaneous chemicals (including industrial chemical products & preparations)		X	
Major Group 29	Products of Petroleum & Coal			
291	Petroleum refining		X	
293	Coke & by-products		X	
295	Paving & roofing materials		X	
299	Miscellaneous products of petroleum & coal		X	

Table 88 (Cont.)

S.I.C. Group No.	Name	Degree of Possible Suitability for Saskatchewan		
		1	2	3
Major Group 30	Rubber Products			
301	Tires & inner tubes			X
302	Rubber footwear			X
303	Reclaimed rubber		X	
309	Rubber industries (not elsewhere classified)		X	
Major Group 31	Leather & Leather Products			
311	Leather: tanned, curried, & finished	X		
312	Industrial leather belting & packing		X	
313	Boot & shoe cut stock & findings			X
314	Footwear (except rubber)			X
315	Leather gloves & mittens		X	
316	Luggage			X
317	Handbags & small leather goods	X		
319	Miscellaneous leather goods		X	
Major Group 32	Stone, Clay, & Glass Products			
321	Flat glass			X
322	Glass & glassware, pressed or blown			X
323	Glass products made of purchased glass		X	
324	Cement, hydraulic			X
325	Structural clay products		X	
326	Pottery & related products		X	
327	Concrete, gypsum, & plaster products		X	
328	Cut-stone & stone products			X
329	Abrasive, asbestos, & miscellaneous nonmetallic mineral products		X	
Major Group 33	Primary Metal Industries			
331	Blast furnaces, steel works, and rolling mills			X
332	Iron & steel foundries		X	
333	Primary smelting & refining of nonferrous metals			X
334	Secondary smelting & refining of nonferrous metals and alloys			X
335	Rolling, drawing, & alloying of nonferrous metals			X
336	Nonferrous foundries			X
339	Miscellaneous primary metal industries		X	
Major Group 34	Fabricated Metal Products (except ordnance, machinery, & transportation equipment)			
341	Tin cans & other tinware			X
342	Cutlery, hand tools, & general hardware		X	
343	Heating apparatus (except electric) & plumbers' supplies	X		
344	Fabricated structural metal products	X		
346	Metal stamping, coating, & engraving		X	
347	Lighting fixtures		X	
348	Fabricated wire products		X	
349	Miscellaneous fabricated metal products		X	
Major Group 35	Machinery (except electrical)			
351	Engines & turbines			X
352	Agricultural machinery & tractors		X	
353	Construction & mining machinery & equipment			X
354	Metalworking machinery			X

Table 88 (Cont.)

S.I.C. Group No.	Name	Degree of Possible Suitability for Saskatchewan		
		1	2	3
Major Group 35	(Continued)			
355	Special-industry machinery (except metalworking machinery)		X	
356	General industrial machinery & equipment		X	
357	Office & store machines & devices			X
358	Service-industry & household machines			X
359	Miscellaneous machinery parts		X	
Major Group 36	Electrical Machinery, Equipment, & Supplies			
361	Electric transmission & distribution equipment			X
362	Electrical industrial apparatus			X
363	Household appliances		X	
364	Electric lighting & wiring equipment		X	
365	Radio & television sets		X	
366	Communication equipment		X	
367	Electronic components & accessories		X	
369	Miscellaneous electrical machinery, equipment, & supplies		X	
Major Group 37	Transportation Equipment			
371	Motor vehicles & motor-vehicle equipment			X
372	Aircraft & parts		X	
373	Ship & boat building & repairing		X	
374	Railroad equipment			X
375	Motorcycles, bicycles, & parts			X
379	Transportation equipment (not elsewhere classified)		X	
Major Group 38	Professional, Scientific, & Controlling Instruments; Photographic & Optical Goods; Watches & Clocks			
381	Laboratory, scientific, & engineering instruments (except surgical, medical, & dental)		X	
382	Mechanical measuring & controlling instruments		X	
383	Optical instruments & lenses		X	
384	Surgical, medical, & dental instruments & supplies		X	
385	Ophthalmic goods		X	
386	Photographic equipment & supplies		X	
387	Watches, clocks, clockwork-operated devices, & parts		X	
Major Group 39	Miscellaneous Manufacturing Industries			
391	Jewelry, silverware, and plated ware		X	
393	Musical instruments & parts		X	
394	Toys & sporting & athletic goods		X	
395	Pens, pencils, & other office & artists' materials		X	
396	Costume jewelry, costume novelties, buttons, & miscellaneous notions (except precious metal)		X	
397	Fabricated plastics products (not elsewhere classified)	X		
3981	Brooms & brushes		X	
3982	Cork products		X	
3983	Matches	X		
3984	Candles	X		

Table 88 (Cont.)

S.I.C. Group No.	Name	Degree of Possible Suitability for Saskatchewan		
		1	2	3
Major Group 39	(Continued)			
3985	Fireworks & pyrotechnics	X		
3986	Jewelry cases & instrument cases	X		
3987	Lamp shades	X		
3988	Morticians' goods		X	
3991	Beauty-shop & barber-shop equipment		X	
3992	Furs, dressed & dyed	X		
3993	Signs & advertising displays		X	
3994	Hair work		X	
3995	Umbrellas, parasols, & canes		X	
3996	Tobacco pipes & cigarette holders		X	
3997	Soda-fountain & beer-dispensing equipment		X	
3998	Models & patterns (except paper patterns)		X	
3999	Miscellaneous fabricated products (not elsewhere classified)		X	

Products Not Manufactured in Saskatchewan

Additional suggestions for industrial and commercial opportunities may be developed from a list of products not manufactured in Saskatchewan, but manufactured elsewhere in Canada. A list of this type was created from data appearing in the 1957 Canadian Trade Index. The list comprises Table 89.

Summary

Many of the major gaps in production in Saskatchewan have been filled, particularly in recent years. Much of what is left includes a multitude of smaller opportunities. The many miscellaneous commercial and industrial opportunities suggested by the above analysis will continue to increase in magnitude in conjunction with continual developments in oil, potash, and various other resources, and with the continued development of secondary and service industries.

Effective action the government can take to initiate interest in these prospective opportunities is to continue the series of opportunity studies which has been begun by the Industrial Development Office. Such preliminary feasibility studies are excellent examples of the type of activity which is most likely to lead to expansion of business in the market-oriented industries.

Table 89

PRODUCTS NOT MANUFACTURED IN SASKATCHEWAN

Acetaldehyde
Acetylene apparatus and appliances
Acids
Additives
Adhesives
Adsorbents
Aftercoolers
Air cleaners
Aircraft accessories and parts
Alarms, burglar
Alarms, electric
Albums, autograph, photo, etc.
Alcohol
Alkali
Almond paste
Alpha methyl styrene
Ammonia
Ammonium chloride
Ammonium hydroxide, C.P.
Ammonium nitrate
Ammonium phosphate
Ammonium sulphate
Ammunition
Amplifiers
Amyl acetate
Anchors, guy
Anchors, screw and bolt
Angles and channels
Aniline
Anodes
Antioxidants
Applicators, floor wax, etc.
Aprons, women's, etc.
Aprons, leather, comb and gill
Argon
Arsenate of lead
Asbestos
Assayers
Autoclaves
Automobile radiator cleaner
Axes and adzes

Baffles
Bag ties
Bags, leather
Bakers' supplies
Barns, metal clad
Bases, boiler, column, etc.
Bases, stool and table
Basins
Batteries, dry
Batteries, storage
Bearings
Belts, safety
Binder twine
Birds, for trap and skeet shooting
Biscuits, dog
Biscuits, fox
Blackboards
Bleaching agents
Blowers, domestic furnace
Bolts, fancy head, pin head, etc.
Boxes, letter, apartment house
Breechings, boiler
Brewers' grains
Brooders
Buckets, mopping
Bushings, cast iron
Buzzers, electric

Caps, bottle, jar and tube
Carts, shopping
Cement, asphalt
Chain, anchor, stud link
Circuit breakers, air break and oil
Coffee roasters, packers and grinders
Compressors, air
Conduits for electric wiring
Conveying and elevating systems

Table 89 (Cont.)

Disinfectants

Eavestrough
Electric fixtures

Fan and exhaust systems
Fence, angle
Fence, electrified, farm
Fencing, wire, woven
Fertilizer material
Fire alarm apparatus
Fittings, bathroom
Fittings, pipe
Forms, carbonized and continuous
Furnaces, gas
Furniture in the white

Glue

Hardware, builders'
Humidifiers

Icings, cake
Indicators, water
Ingots, aluminum
Inhibitors, corrosion
Injectors, automatic, steam and boiler
Ink, beef branding
Ink, writing
Innersoling
Inserts, valve seat
Insoles, boot and shoe
Instruments, electrical
Instruments, industrial, electronic
Instruments, radioactivity measuring
Irons, electric, household
Irons, electric, tailors' and machine
Irrigation systems

Jacks, automobile
Jacks, electrical
Jacks, hoisting, lifting and screw
Javelle water
Jigs
Joints, expansion
Junction boxes

Key tags
Kick plates
Knobs, door
Knobs, furniture
Knobs, plastic

Labels, adhesive
Labels, embossed brass
Laces, leather, belt and special
Lacrosse sticks
Ladders, aluminum, duralumin, etc.
Lamps, electric, table
Leather, belting
Leather, boot and shoe upper
Leather, chrome tanned
Leather, harness, saddlers', etc.
Leathers, hydraulic, mechanical and pump
Legs, furniture
Links, chain
Lintels
Loaders, truck, tailgate
Lockers, metal
Locks, bank, prison and railroad signal
Locks, bicycle and locker
Locks, cabinet, cupboard, drawer, etc.
Locks, cylindrical
Locks, dead, mortise, cylinder, etc.
Locks, tubular

Table 89 (Cont.)

Lugs for electric cable

Macaroni
Machinery, abattoir
Machinery, conveyor
Machines, drilling
Magnesium
Mandrels, saw
Mantels, wood
Margarine
Markers, cemetery, road and survey
Marquees
Masts, tubular steel
Mauls
Meal, bone
Metal press work
Mirrors
Mops
Mucilage
Mufflers

Nail sets
Nails, cut, all kinds
Nails, wire
Neckwear, men's
Netting, wire
Nipples, pipe
Nitrogen
Nosings, stair
Novelties, advertising
Numbers, metal
Nuts

Openers, bottle

Packing, asbestos
Packing, flax
Packing, flexible, metallic
Packing, jute
Packing, rubber, sheet, ring, and spiral
Packings, cotton
Packings, engine, etc.
Packings, fabric, braided or moulded
Packings, fibreglass
Packings, leather
Packings, plastic
Packings, shredded metallic
Paddles, paint, etc.
Pads, desk, bridge, calendar, etc.
Pads, hand, leather
Pads, heating, electric
Pads, rubber, small and large
Pads, sanitary
Pads, stamp
Pads, upholstry
Pads and covers, ironing board
Pails, galvanized
Pails, tin
Paint, anti-corrosive and damp-proofing
Paint, house
Panel boards, electric
Panels, instrument
Panels, radio
Panels, steel
Panels, switch, plastic moulded
Panels, veneer
Pans, bakers' and confectioners'
Pans, frying
Paper, alkali-proof
Paper, asbestos
Peanut butter
Peanuts, salted
Peels, candied and glacé
Pillows
Pills
Pin tickets
Pins, clevis
Pins, crank
Pins, drift

Table 89 (Cont.)

Pins, hair
Pins, milled, shoulder, threaded and taper
Pipe, cast iron
Platers, brass, copper, etc.
Platers, cadmium
Platers, chromium
Platers, gold and silver
Platers, etched metal
Plates, license
Plates, match, aluminum
Plates, paper, fibre, or foil
Platforms, lift truck
Pole steps
Police radio and signalling equipment
Polish, floor and woodwork
Polish, metal
Polish, silver
Popcorn and corn confections
Powder, chocolate
Powder, soap
Powder, talcum
Powder, tooth
Powder, washing
Powdered metal products
Power take-offs
Precision devices
Press, drill
Pullers, car
Pulleys, awning
Pulleys, ball bearing
Pulleys, cast iron, solid, or split
Pulleys, clothesline, etc.
Pulleys, fibre or composition
Pulleys, hay fork
Pulleys, sash
Pulleys, steel, split
Pulleys, wood
Pulls, door
Pumps, centrifugal
Pumps, chemical
Pumps, circulating
Pumps, condensation
Pumps, deep well
Pumps, high pressure
Pumps, hydraulic
Putty
Pyjamas
Pyrometers

Racks, book
Racks, broiler and oven
Racks, clothing
Racks, display
Racks, electric pole
Racks, factory for bakers, etc.
Racks, shoe
Radar equipment
Radiators, concealed
Radiators, electric
Radiators, hot water and steam
Rails, guard
Ranges, combination gas and coal
Ranges, electric
Ranges, gas
Ranges, household (oil)
Reinforcements, concrete
Reinforcing, vault
Relays, electric
Remover, paint and varnish
Remover, rust or tar
Rivets, aluminum
Rivets, belt
Rivets, blind
Rivets, boiler
Rivets, brake lining
Rods, aluminum
Rods, brass
Rods, bronze
Rods, copper
Rods, fishing
Rods, wire

Table 89 (Cont.)

Rompers
Roof decks, steel
Rope and twine, nylon
Rubber goods, extruded
Rubber goods, mechanical
Rust preventive

Safes
Saw benches
Saw frames, hack
Scoops, grocers', bakers', etc.
Scoops, steel, coal
Scrapers, sidewalk, etc.
Screw machine products
Screws, drive
Screws, wood
Sheathing, building, metal
Shellac, liquid
Shelving, metallic
Shields, expansion bolt
Shims
Shin guards
Showcases, counters, floor and wall
Siding, asbestos
Siding, asphalt
Siding, insulated
Sifters, ash
Signals, railway fuses and truck torpedoes
Signals, traffic
Signs, silk screened
Slippers, boudoir
Slippers, leather and cloth
Smocks, ladies' and children's
Smocks, men's work
Soap, chip
Soap, laundry
Soap, pumice
Soap, scouring and fulling
Soap, soft oil
Socks, knit, men's
Sterilizers
Stills and condensers
Stools, store and counter
Store fronts
Stove pipe
Stove pipe elbows
Switchboards
Switches, automatic relay
Switches, disconnecting
Switches, electric
Switches, float
Syrup, chocolate
Systems, continuous forms for autographic registers, etc.

Tables, folding
Tables, household
Tags, brass
Tags, license
Tanks, gas
Tanks, lined
Tanks, monel metal and stainless steel
Tanks, portable
Tanks, transformer
Tape, paper
Tea blenders and packers
Terminals, cable and accessories
Thermocouples
Thermometers, advertising
Thermometers, industrial
Thermometers, recording
Thermostatic controls
Transformers, bell ringing
Trolleys, I beam and flat bar
Tubing, aluminum
Tubing, brass, bronze, and copper
Tubing, welded and open seam

Underskirts and costume slips
Underwear, men's cotton
Unit coolers

Table 89 (Cont.)

Unit heaters

Varnish, auto, boat, etc.
Ventilating apparatus
Ventilators
Vents, air

Washers, lock, split, and spring
Washers, rubber
Water distributing systems
Whisks
Whiskey
Winches
Winches, electric
Windbreakers

Sources: 1958 Canadian Trade Index, the Canadian Manufacturer's Association. Directory of Saskatchewan Manufacturers, Industrial Development Office, Government of Saskatchewan, July 1959.

Section IX

ORGANIZATION AND PROGRAM FOR INDUSTRIAL DEVELOPMENT



Road-building in Northern Saskatchewan

SASK. GOV'T PHOTO

Section IX

ORGANIZATION AND PROGRAM FOR INDUSTRIAL DEVELOPMENT

In organizing for industrial development of an area such as Saskatchewan, activities can be initiated at two levels: (1) the provincial level, which is almost entirely the responsibility of the government, with province-wide organizations such as the provincial chamber of commerce, transportation companies, and utilities playing an important role, and (2) the community level, which includes municipal government and local chambers of commerce.

The objective of any program of industrial development is to encourage outside and local interests to invest in industry in the province and local community. Attracting industry has become highly competitive, and members of the public and business community should keep in mind that if these investors do not establish branch plants in the province, they may establish elsewhere--probably in Alberta or Manitoba--to the advantage of local businesses and living standards in these other areas. In competing for outside investors it would be well not to overlook the fact that an important source of capital and entrepreneurial ability can often be found within the community.

Provincial Development Program

Policies for Industrial Growth

The following suggestions pertain to strengthening the industrial development program of Saskatchewan and activities in which the government could provide leadership. These suggestions are predicated upon observations made during field work in the Prairie Provinces and the United States, and upon comments received during interviews. The suggestions are only suggestions, resulting from thoughtful consideration; obviously they do not represent exhaustive analytical studies of the various basic elements comprising each subject.

1. The government could give consideration to the establishment of a department of industry and commerce. Such a department could consolidate the services of a number of existing government agencies which are primarily oriented to different aspects of industrial development. These agencies are the Industrial

Development Office (IDO), Trade Services Branch, Freight Services Division, and the Office of the Agent-General. Other functions which could come under the jurisdiction of this department are the Industrial Development Fund (IDF), the Saskatchewan Research Council, and a productivity agency discussed in further detail below.

2. An effective industrial development program requires good factual material so that the leaders of the program can assess the progress being made and prospective manufacturers can see what the province really has to offer. To this end the government might consider the consolidation of data-gathering agencies into one office to handle the collection and analysis of statistics, particularly those statistics relating to industry and commerce.

3. The establishment of a productivity agency in the province is worthy of government attention. Such an agency could be concerned with assisting Saskatchewan industries with management, organization, and engineering problems associated with increasing efficiency. This agency could be a branch of a department of industry and commerce if one were established.

4. A clear statement of policy regarding the position of the government, the IDO, and the IDF in assisting new industries to establish, or existing industries to expand, would undoubtedly stimulate interest in Saskatchewan. The position of the IDO as liaison between prospective manufacturers and other provincial and local government agencies, utilities, and transport companies might be made clear. Principles could be laid down by the government, outlining the conditions under which a firm might expect to have a loan underwritten by the province. Questions arise, such as: Must an applicant have already been refused a loan by a commercial bank or the Industrial Development Bank before he can be considered? What specific enterprises are not eligible for loans? What control or restrictions does the IDF impose upon the receiver of a loan in the operation of his business? What specific uses of loan capital are not considered by the Fund? The government might also outline the conditions under which the government itself or a Crown Corporation might make an advance purchase contract with a prospective industry.

An effective device for providing information would be a check list, such as that the IDO uses in investigating prospective operations, stating pertinent questions and then stating specific answers. Check lists may be developed in brochure form.

5. The IDF might consider extending loans to industries for working capital under certain circumstances in addition to loans for fixed capital. Also, extending loans for capital investment in tourist facilities warrants investigation.

6. The establishment of a branch of the Federal Industrial Development Bank in Regina or Saskatoon could be supported.

7. The government could consider the problem of truckload limits currently enforced in the province, so that the IDO can appraise the effects these limits have on the trucking industry, industries utilizing trucks, and service businesses associated with trucking.

The government could be continuously alert to supporting and initiating changes such as those suggested that would improve the mechanics of establishing and doing business in Saskatchewan.

The government should bear in mind the importance of investment in long-term economic development of the province. Items in the long-term category include research, geological mapping, new roads, and utilities. The government will continually face the problem of arriving at the optimum balance between investment in long-term economic growth and needs of a more immediate nature.

Promotion Techniques

After observing and evaluating the activities of the Saskatchewan Industrial Development Office, the following suggestions pertaining to the future program of the government and IDO are offered as an aid to IDO in its decisions with respect to making its program more effective and beneficial. Some of the suggested activities may already be part of the program; others may be new and may warrant implementation.

1. Visits of Saskatchewan businessmen and industrialists to other provinces, the United States, Europe, and elsewhere around the world have a tremendous communication impact in the places they visit. These visits, which could be part of the IDO program, could be accomplished in cooperation with chambers of commerce through honorary memberships, through such devices as appointments of special delegates, and through provision of information for dissemination. Prior to departing from Saskatchewan, each person could be made to feel a sense of pride and responsibility in his mission to represent and publicize the province.

2. Endeavors could be made to distribute information and to facilitate communication about domestic circumstances and living amenities in Saskatchewan. Information of this type is particularly important to prospective residents. Perhaps inquiries could be invited through a continuous announcement in the "Industrial Saskatchewan," and inquiries could be answered by businessmen or housewives, rather than by the IDO staff, in order to make the communications more personal. An information bureau could be set up to facilitate exchange of information on common conditions in daily business operations and daily domestic affairs, such as school characteristics, grocery shopping, family outings, and cultural activities.

3. Consideration could be given to replacing the established Saskatchewan symbols. Instead of publicizing the "wheat sheaf" and the "prairies," the IDO might encourage publicity based upon cities, industries, and recreation attractions. At the present time, the established symbols appear on envelopes and letterheads, on covers of brochures, and in other forms of publicity media reaching a world-wide audience. Equivalent efforts emphasizing industry and commerce probably would be very effective. Perhaps a motto or slogan could be adopted for use on letterheads of leading business establishments that would result in time in substantial subconscious education and publicity.

4. A specific promotion device that may have merit is the use of calendars in overseas countries. Publishers of calendars ordinarily must pay for good pictures and informational materials that go into attractive, salable calendars. It is likely that leading publishers would welcome a series on Saskatchewan, and might work with the IDO to make an attractive, informative layout. The United States calendar business is a very significant medium; the possibility of promoting the province through this means is an excellent one which warrants full consideration.

5. Promotional ideas for possible implementation in Regina and Saskatoon are: (a) a card of welcome from the IDO presented to hotel guests, offering assistance while the guest is in the province, and (b) a follow-up program on responses to the card of welcome, which would emphasize personal promotion of industry and commerce; for those guests of particular importance, a special luncheon or other honorary activity might be warranted.

6. The IDO might be cognizant of, cooperate with, and complement the work of other industrial development organizations. There

are various excellent reports available from government agencies and industrial development organizations in the province and Canada which could be specifically called to the attention of the target audience. There are also a number of U.S. Department of Commerce reports on various aspects of doing business in Canada.

7. In "Industrial Saskatchewan," a conspicuously boxed format in each issue could enumerate sources of further detailed information, either from government departments and industry associations, or from the IDO. This would help make the reading audience aware of such organizations, and would suggest the types of detailed data that are available.

8. The IDO could consider giving more attention to an organized promotional program using personal contact. Such a program could be based on research which would identify a gap in the province's manufacturing complex. The opportunity for filling this gap could then be given detailed study. An industrial consultant from the IDO, equipped with the facts, could then make personal visits to specific people in Canada and the United States who might be interested in undertaking the enterprise. In those cases where the opportunity may be of interest to a European manufacturer, the details could be supplied to the Saskatchewan Special Representative in London, who could then make the personal contact.

Community Development Program

A coordinated community development program is essential for the economic expansion of the province. Such a program involves a thorough appraisal of the type of economic activities possible and desirable in the various parts of the province. This appraisal could reflect the thinking of all local interests. To serve these ends, the IDO has established a program of assistance in municipal development and most of the cities have active industrial development committees. No Saskatchewan city has, as yet, a permanent industrial development commissioner but most chambers of commerce and municipal councils have undertaken the local responsibility for working toward industrial expansion.

The problems of attracting industry to a particular community are difficult ones. Through the IDF, the IDO has helped many industries to become established. Further, the IDO has indirectly assisted all Saskatchewan communities by attracting new investment capital to the province. However, in promoting the interest of the smaller communities,

the IDO and other industrial development organizations are faced with a fundamental trend of industry location characteristic of today's modern economy. This is the overwhelming tendency of industrial and commercial development to take place in or near the largest metropolitan areas. The major centers having a concentration of population represent the most attractive local markets and hence have the best potential for industrial growth. The smaller centers are hampered by the fact that they are unable to compete with the major cities in being able to offer serviced industrial sites, social amenities, and transportation and general service facilities to which industry is accustomed in the metropolitan areas of eastern Canada and the United States.

Nevertheless, there is much that can be done both by provincial and municipal organizations. The following suggestions and discussions are aimed at providing ideas and guidelines for the IDO and its community development program and for the various communities in their activities. The suggestions are organized under three categories: IDO community relations, community industrial development activities, and development corporations.

IDO Community Relations

1. The IDO might consider establishing an advisory board to include representatives from all major communities throughout the province. Such a board could meet annually or semiannually for a conference of a seminar nature. Proceedings of the meeting (which might consist of morning, afternoon, and evening sessions with guest speakers) could be interesting and instructive to the participants and could add a cohesive unity, vitality, and correlation to the industrial development activities.

2. The IDO might consider preparation of a standard industrial survey summary report for Saskatchewan communities. This would consist of a loose-leaf compilation of survey reports prepared by the individual communities on the basis of a uniform format. The uniform format would provide standardized data and would facilitate analyses and evaluations of each community by representatives of prospective industries. A suggested form (the one in use by the Chamber of Commerce of the State of California) which may be appropriately modified for use in Saskatchewan is shown in Appendix B.

   After the completion of the survey form by each community, the IDO could assemble copies from each community into complete

volumes. For this purpose, each community might provide the required number of copies of its survey, printed to specified size by the community and at its expense. The IDO could check the statistics and add a map and statistical data about the province as a whole. Individual volumes of combined surveys could then be placed with strategic people or organizations such as banks, railroads, and utilities to serve industrial development functions.

Experience might demonstrate that all communities may not at first participate in this survey and informational activity. Over time, however, all major communities would probably do so. Also, over the years, each community data sheet could be updated through preparation by the community of a new survey, and subsequent distribution of the new form to holders of records of the combined volume.

Although the process as described may appear cumbersome and complicated, the preparation and updating of this province-wide survey is actually a very simple cooperative activity. The end product is an extremely worthwhile industrial development tool.

3. The IDO might advise and instruct in the formation of city and community committees and the industrial development functions of those committees.

4. The IDO may wish to provide a central clearinghouse and depository for specific and well-organized economic data on the industrial advantages and resources available in Saskatchewan communities.

5. Consideration might be given to the development of a personalized quarterly letter or report for distribution in Saskatchewan communities to summarize current activities and to inform the communities of successful developments.

Community Activities

The trend of industrial expansion toward location in the large metropolitan areas, mentioned above, is based upon economic reasons having to do with markets, distribution costs, availability of skilled labor and technical services, nearness to interrelated industries, and so forth. This general trend makes industrial development activities

difficult and discouraging for communities located away from metropolitan areas. Further discouragement results from the competition in industrial development activities with hundreds of other communities, each somewhat comparable with the others and each searching for industry.

In initiating its industrial development activities, the community should first determine what its objectives are. Consideration of this matter might suggest that the community is quite desirable the way it is and that no great changes are wanted. Smaller communities often want to grow into large communities while large communities--with congestion, pollution, slums, lack of greenbelts, and so forth--look with envy on the characteristics of the smaller community. Size is less important than quality; it's better to be the best town in the province than the biggest.

However, if the decision is to expand industry, then the community needs to know what its characteristics and assets are, what circumstances need to be changed to make the area's characteristics attractive to industry, and what activities are necessary to accomplish its objectives. A check list for a community industrial development program is given in Appendix B.

These activities can and ought to be accomplished by members in the community through development of a community organization. The organization might include a Community Development Council with a director, an executive committee, a publicity committee, finance committee, trades and services committee, marketing committee, research committee, an industrial development committee, and a civic improvements committee. Participation within the community is essential, and may appropriately include committees other than the ones enumerated. Perhaps the local chamber of commerce should be the vehicle for this over-all community organization.

The functions of these various committees are somewhat obvious from their description titles. For instance, the industrial development committee has the strategic job of checking the factors of importance to existing or potential local industry. A check list of such factors is presented in Appendix B.

The trades and services committee also has critical functions. Manufacturing is not the sole road to community economic progress. Many communities could profitably expand both industrial and commercial activities at the same time, and some communities would do much better in commercial than in manufacturing activities. Hence, this committee is concerned with such questions as:

1. What is the size and composition of the local group of retail stores? How many people are employed in these local stores? What is the volume of retail trade per capita? Do local people buy locally or do they frequently go elsewhere to shop? If they go elsewhere, where do they go, what do they buy, and why do they go elsewhere? What vacant business properties exist in the shopping district? What types of retail stores are conspicuously absent?

2. From what distance does the local center draw? What factors determine the boundaries of this shopping area? Can these factors be altered? What is the purchasing power and living standard of the retail shopping area?

The research committee assembles and organizes specific data on potential industries, either in response to requests from interested prospects or on its own initiative, to demonstrate the reasonableness and attractiveness of the opportunities which they have analyzed and which they feel exist in the community. These feasibility studies then become sales tools for use in interesting either a local enterpriser or an investor and organizer from elsewhere.

Consideration of the local enterpriser and local business already established is of paramount importance. In the first place, industries presently in operation are excellent community assets and warrant full support. Also, about 80 percent of the economic growth of the average community derives from the creation and expansion of locally owned and locally operated enterprises. There are a number of reasons for giving local enterprise prime consideration:

1. Existing local enterprises have sprung from local needs and/or local resources.

2. Existing local enterprises have proved their adaptability to local conditions.

3. Many local enterprises were developed with local money, and all of them provide jobs for local people. Such interests deserve first consideration.

4. Growth and improvement of existing local enterprises should make them more efficient and therefore more productive of income for local people.

5. Internal growth usually brings about a net expansion of the national economy. Relocation of industry from one town to

another may do little more than shift the checkers on the board.

6. The industrial development committee will normally get quicker action by dealing with its neighbors who manage local enterprises than it would by negotiating with strangers.

It is sometimes said that it is harder to arouse interest in internal expansion because such expansion is less dramatic and lacks the color that is part of the location of an outside industry in the town. This need not be so. A good publicity committee can make an interesting story out of internal growth.

Friendly discussion of development possibilities with the top executives of local industries is always helpful. Experience shows that local industry sometimes needs and welcomes local cooperation in dealing with such problems as the following:

1. Changes of any kind in buildings or site.

2. Better labor supply or labor relations.

3. Reducing or filling gaps in seasonal business.

4. Securing materials for processing.

5. Securing subcontractors.

6. Securing engineering or research on improved or new products and designs.

7. Securing financial services.

8. Expanding markets of local products.

9. Securing better transportation or adequate public utility service.

10. Improving municipal services--police, fire, traffic problems, sewerage, local transportation, etc.

11. Encouraging civic action on housing, health, safety, education, recreation, tax legislation, etc.

12. Establishing vocational training departments in the local school system.

Progressive communities show their appreciation of the local importance of local industry through friendly gestures which publicly recognize a good job well done, such as testimonial dinners and the timely publication of news stories about specific achievements of specific plants. An annual display of the products of local industry effectively gives such recognition and, at the same time, educates local people as to the real sources of local prosperity. Community advertising, stressing the merits of specific home town products, has been equally effective.

A major source of industrial development lies in the new business ideas of residents of the community, or in ideas developed during community surveys. Almost every big business had its start as an idea in the mind of some one individual in an average-sized community. For instance, there may be an opportunity in a specific town for plants to provide present factories with services such as a foundry, machine shop, plating works, trucking line, or subcontracting. It may be that new plants could be erected which would utilize present industrial or agricultural products as raw materials.

Another possibility is a plant to fabricate or process existing natural resources. Cinder block and cement block plants are examples. What about the waste products, or the by-products of existing local plants? Could they be the basis of a small local enterprise? Somewhere in these general possibilities there may be real local opportunities awaiting profitable development. Businesses often originate in various communities on the basis of an idea, a lot of ambition and initiative, and little capital. These fledgling industries often develop into substantial industrial enterprises.

Community Development Corporations

An effective method of fostering industrial development has been the use of development corporations--both privately and municipally operated. One of the most outstanding examples of the application of these corporations is to be found in Scranton, Pennsylvania. In this city, four corporations--all nonprofit organizations--handle planning, development financing, and building of plants.

These corporations are the Scranton Industrial Development Company, the Scranton Plan Corporation, Lackawanna Industrial Fund Enterprises, Inc., and Scranton-Lackawanna Industrial Building Company. Their activities include promotion; provision of technical services in site selection; negotiations between prospective industries and landowners, utilities, and transportation companies; and purchase of land, building arrangements, and

financing. Depending on the specific situation and size of a community, these activities may be merged into one corporation.

The control of such corporations is governed by the source of capital. The corporations may be financed solely by local residents who buy lands, the local chamber of commerce may have a financial interest in the venture, or the city may provide all or some of the funds from tax sources.

Another type of organization is quasi-public where the city supplies some money from tax sources and the remainder is subscribed by local citizens in the form of bonds. Regardless of the control, it is essential that the corporation have good liaison with the city government, which controls taxation and provision of roads and utilities.

Obviously, the activities of a development corporation will be governed by the funds available. Besides general promotion, the corporation may buy up land and service it with roads and utilities suited to immediate plant construction. It may go further and buy up vacant buildings, such as abandoned defense plants and airport hangars, and make them available on a lease basis to industries. Another service which the corporation may provide is to arrange the contract for building a plant, because in some cases, if the prospective industry's name is not revealed, the corporation is able to get lower bids than might otherwise have been possible. If the corporation is well funded, it may even build the plant for a specific company and lease it with an option to buy. Under this system a plant can be financed at no capital outlay by the tenant.

As the development corporations are on the whole nonprofit, income from sales or lease of land and buildings can be used over and over again to finance new construction. A sound corporation can also attract banks and insurance companies to advance capital. If such a corporation were established in Saskatchewan, it might wish to seek provincial aid in three forms: (1) have the provincial government underwrite bond issues, (2) have the provincial government allow second mortgages up to a given percentage of the plant's cost to be placed with the Industrial Development Fund; and (3) have the provincial government provide capital at a low interest rate to supplement local capital in the operation of the corporation.

A community development corporation, whether public or private, must avoid being so anxious to obtain an industry that the major feasibility considerations are overlooked: an industry which establishes in a community on unduly favorable terms and subsequently fails does immeasurable harm to the community's future development possibilities.

Appendix A

STATISTICAL MATERIAL

Table 90

PRINCIPAL STATISTICS OF THE INDIVIDUAL INDUSTRIES
1956

Industries	Establishments			Total Employees			Value Added by Manufacture		
	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan
Food and Beverages									
Bakery products									
Biscuits	3	3	1	221	335	--	$ 1,514,065	$ 2,349,302	$ --
Bread and other bakery products	144	144	98	1,881	1,785	1,151	9,385,836	7,776,206	5,492,188
Beverages									
Breweries	6	6	5	547	598	345	11,880,754	9,228,241	7,304,965
Carbonated beverages	24	22	24	342	373	238	3,426,929	3,441,450	2,333,238
Canning and processing									
Fruit and vegetable preparations	7	9	1	325	210	--	1,844,473	931,266	--
Dairy products									
Butter and cheese	98	69	57	1,901	1,273	1,266	8,754,907	6,438,077	7,035,601
Cheese process	1	--	--		--	--		--	--
Concentrated milk products	2	--	--	103	--	--	1,206,180	--	--
Dairy products, others	1	--	--		--	--		--	--
Grain mill products									
Feed, stock, poultry prepared	47	36	10	272	244	63	2,097,839	1,764,985	327,649
Feed mills	36	10	5	61	22	7	189,444	81,606	39,214
Flour mills	11	7	9	720	579	752	6,078,967	4,129,988	6,119,615
Meat products									
Slaughtering and meat packing	15	13	8	3,961	3,196	1,160	26,383,993	24,416,035	8,982,156
Sausage and sausage casings	--	9	1	--	172	--	--	543,281	--
Other food industries									
Confectionery	7	12	3	32	312	13	235,089	1,366,958	62,312
Animal oils and fats	2	2	--			--			
Distilled liquors	1	--	--			--			
Cheese process	--	1	--			--			
Foods, breakfast	2	--	--	609	239[1]	--	7,452,210	2,019,504[1]	--
Macaroni and kindred products	1	2	--			--			
Sugar refining	3	1	--			--			
Miscellaneous food preparations	14	23	6[2]	266	564	47	2,655,399	5,176,756	346,988[2]
Total	425	372	225	11,241	9,922	5,052	$ 83,106,085	$ 70,130,282	$ 38,043,926
Tobacco and Tobacco Products	--	--	--	--	--	--	--	--	--
Rubber Products									
Rubber goods, including footwear	*	3	--	*	12	--	*	92,963	--
Total	--	3	--	--	12	--	--	$ 92,963	--
Leather Products									
Leather tanning	3	--	--	4	--	--	14,159	--	--
Other leather industries									
Footwear, leather	--	6	--	--	260	--	--	1,080,764	--
Gloves, mittens	1	7	--	38	242	--	118,757	729,014	--
Miscellaneous leather goods	6	8	--		191[3]	--		773,004[3]	--
Total	10	21	--	42	693	--	$ 132,916	$ 2,582,782	--
Textiles									
Awnings, tents, sails	9	8	3	68	70	13	330,003	203,125	39,176
Embroideries, pleating, hemstiching, etc.	3	5	4	20	31	59	58,127	104,775	205,875
Bags, cotton and jute	2	3	1	--	207		--	1,113,084	
Narrow fabrics	1	1	--	--		--	--		--
Automobile accessories fabric	--	2	--	--	71	--	--	266,941	--
Carpets, mats, rugs	--	2	--	--		--	--		--
Woolen cloth	1	3	--	--	255	--	--	1,290,708	--
Miscellaneous textiles, n.e.s.	2	13	--	287[4]	105	--	1,979,239[4]	354,190	--
Synthetic textiles, silk	2	--	--	--	--	--	--	--	--
Total	20	37	8	375	739	72	$ 2,367,369	$ 3,332,823	$ 245,051

* Confidential, included in "Miscellaneous Industries."

1/ Figures include cheese, process and exclude distilled liquors and breakfast foods.
2/ Figures include biscuits, fruit and vegetable preparations, sausage, and sausage casings.
3/ Figures include leather tanning.
4/ Figures include narrow fabrics, woolen cloth, cotton and jute bags, miscellaneous textiles, n.e.s., synthetic textiles and silk.

Table 90 (Cont.)

Industries	Establishments			Total Employees			Value Added by Manufacture		
	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan
Knitting Mills									
Hosiery	1	--	--	44	--	--	$ 138,955	$ --	--
Knitted goods	3	4	--		78	--		344,375	--
Total	4	4	--	44	78	--	$ 138,955	$ 344,375	--
Clothing									
Men's, Women's, Children's									
Children's factory	--	8	--	--	348	--	--	1,481,647	--
Men's factory	10	53	1	803	2,809	166	3,554,774	9,750,837	617,406
Women's factory	6	24	3	72	1,521		201,640	5,343,306	
Miscellaneous clothing									
Fur goods	6	48	8	40	468	84	136,345	1,765,372	507,963
Fur dressing, dyeing	1	2	--		--[5]	--		--[5]	--
Hats and caps	1	14	--		358	--		1,050,566	--
Clothing, n.e.s.	--	4	--	--	64	--	--	210,000	--
Clothing contractors, women's	--	1	--	--	160[5]	--	--	654,476[5]	--
Total	24	154	12	915	5,728	250	$ 3,892,760	$20,256,204	$ 1,125,369
Wood Products									
Furniture	81	126	29	687	1,787	80	3,242,737	7,924,888	270,633
Saw and planing mills									
Sash, door, and planing mills	112	35	33	1,832	504	417	8,047,384	2,193,836	2,060,403
Sawmills	603	93	164	2,641	342	430	10,469,675	1,020,522	1,036,614
Other wood industries									
Boxes, baskets, wood	4	8	3	164	141	--	602,054	472,912	--
Morticians' goods	6	3	--	31	61	--	210,559	409,424	--
Excelsior	1	2	--	--	83	--	1,478,275	235,921	1,821,039
Veneer and plywood	2	3	2	470		230			
Woodenware		1	--						
Miscellaneous wood products, n.e.s.	12	10	10		115			513,564	--
Total	821	281	241	5,825	3,033	1,243	$25,799,240	$12,771,097	$ 4,856,250
Paper Products									
Boxes, bags, paper	6	10	2	342	603	--	2,562,001	3,338,683	--
Roofing paper	3	4	--	176	134	--	1,879,194	799,462	--
Pulp and paper	1	3	--	117	582	--[6]	879,011	9,734,993	--
Miscellaneous paper goods	1	7	2		193	25[6]		1,513,241	224,409
Total	11	24	4	635	1,512	25	$ 5,320,206	$15,386,379	$ 224,409
Printing, Publishing, and Allied Industries									
Commercial printing									
Printing, bookbinding	82	82	38	947	1,256	248	4,651,683	6,836,896	1,221,705
Trade composition	2	2	2						
Engraving and stereotyping									
Electrotyping	6	8	2	56	405	50	326,002	1,783,235	257,502
Lithographing	3	2	1	18			88,745		
Printing and publishing									
Printing, publishing	79	78	96	1,398	1,951	1,175	10,567,876	11,962,789	6,394,607
Publishing (only) of periodicals	105	123	46	199	181	60	732,140	680,609	175,798
Total	277	295	185	2,618	3,793	1,533	$ 6,683,353	$21,263,529	$ 8,049,612

5/ Figures include clothing contractors, women's; and fur dressing and dyeing.
6/ Figures include boxes, bags, and paper.

Table 90 (Cont.)

Industries	Establishments			Total Employees			Value Added by Manufacture		
	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan
Iron and Steel Products									
Agricultural implements	9	15	7	145	490	36	$ 950,249	$ 2,515,440	$ 170,020
Boilers, tanks, platework	10	3	1	340	126	--	2,868,696	285,539	--
Bridge and structural steel work	5	2	--	951	--	--	6,564,428	--	--
Castings, iron	10	6	6	423	441	109	2,912,334	2,572,975	499,542
Hardware, tools, cutlery	3	4	--	38	43	--	186,960	171,335	--
Heating, cooking apparatus	11	4	--	155	187	--	817,769	1,889,806	--
Machinery, industrial	4	16	6	294	418	158	--	2,406,210	798,465
Machine shops	70	38	22	889	298	109	--	1,511,240	483,495
Sheet metal products	18	26	6	568	1,026	439	--	5,759,599	1,412,482
Miscellaneous iron and steel products	15	11	2	117	682			4,114,227	
Primary iron and steel	3	2	--	312	1,831[7/]	--	1,520,994	17,149,170[7/]	--
Wire and wire goods	2	2	--			--			--
Machinery, household, office and store	--	1	--	--		--			--
Total	165	130	50	4,232	5,542	851	$27,832,588	$38,375,541	$ 3,364,004
Transportation Equipment									
Motor vehicle parts	18	15	5[8/]	311	338	16[8/]	1,489,876	2,040,524	66,721[8/]
Aircraft and parts	1	3[9/]	--	2,743	1,289[9/]	--	--	6,283,242[9/]	--
Boat building	1	6	--		21	--	10,895,019	113,423	--
Railway rolling stock	2	4	--		4,956	--	--	15,871,178	--
Total	22	28	5	3,054	6,604	16	$11,757,040	$24,308,367	$ 66,727
Nonferrous Metal Products									
Aluminum products	4	1	--	17	--	--	78,073	--	--
Brass and copper products	4	6	--	46	149	--	320,001	1,071,233	--
Jewelry and silverware	2	4	--	697	26	--	8,649,517	200,807	--
Nonferrous metal smelting and refining	1	1	--		214[10/]	--		10,190,757[10/]	--
White metal alloys	1	3	--		76	--		560,506	--
Miscellaneous nonferrous metal products	--	3	--	--	--	--	--	--	--
Total	12	18	*	760	465	*	$ 9,047,591	$12,023,303	*
Electrical Apparatus and Supplies									
Refrigerators, vacuum cleaners and appliances	--	5	--	--	105	--	--	377,973	--
Batteries	4	3	--	117	213	--	235,049	1,942,627	--
Machinery, heavy, electrical	1	4	--	60	342	--	750,844	2,260,695	--
Telecommunication equipment	1	1	--		390	--		2,053,655	--
Miscellaneous electrical apparatus and supplies	1	7	--			--			--
Total	7	20	*	177	1,050	*	$ 985,893	$ 6,634,950	*
Nonmetallic Mineral Products									
Cement, hydraulic	3	1	1	440	--	--	6,799,124	--	--
Clay products from domestic clay	10	6	4	484	180	126	2,826,200	567,102	871,358
Concrete products	35	11	19	754	310	205	5,829,374	2,009,391	1,165,659
Glass and glass products	3	4	--	564	26	--	2,956,121	125,354	--
Lime	5	6	--	78	115	--	464,211	735,473	--
Stone products	5	10	4	85	65	22	543,588	347,998	62,814

7/ Figures include bridge and structural steel products.
8/ Figures include miscellaneous transportation equipment.
9/ Figures include motor vehicles.
10/ Figures include aluminum products, miscellaneous nonferrous metal products and nonferrous metal smelting and refining.

Table 90 (Cont.)

Industries	Establishments			Total Employees			Value Added by Manufacture		
	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan
Nonmetallic Mineral Products (Cont.)									
Other nonmetal mineral industries									
Clay products from imported clay	2	--	--	279	--	--	$ 1,247,831	$ --	$ --
Gypsum products	2	2	--			--			--
Salt	2	1	1		679[11/]	--		8,321,057[11/]	--
Miscellaneous nonmetallic mineral products	5	3	2	--		111[12/]	--		802,740[12/]
Total	72	44	31	2,735	1,403	464	$21,537,746	$12,275,640	$ 902,571
Products of Petroleum and Coal									
Petroleum products	17	5	10	2,041			51,877,453		
Coke and gas products	--	1	--	--	780	1,254	--	20,460,973	28,781,969
Miscellaneous products of petroleum and coal	3	1	2	14			153,371		
Total	20	7	12	2,055	780	1,254	$52,030,024	$20,460,973	$28,781,969
Chemicals and Allied Products									
Acids, alkalies, salts	3	--	1	409	--	--	7,350,508	--	--
Soaps, washing compounds, cleaning preparations	5	6	--	18	34	--	251,371	676,544	--
Fertilizers	2	--	--		--	--		--	--
Medicinal and pharmaceutical preparations	1	7	--		112	--	11,208,585	896,075	--
Paints, varnishes, lacquers	1	5	--	961	251	--		2,624,393	--
Primary plastics	2	--	--		--	--		--	--
Vegetable oils	1	3	1		--	--		397,330	--
Other chemical industries									
Gases, compressed	6	3	2	109	78	--	1,325,888	897,386	--
Miscellaneous chemical products n.e.s.	11	13[13/]	5	206	186[13/]	200[14/]	3,056,154	637,000[13/]	1,092,119[14/]
Total	32	37	9	1,703	744	200	$23,192,506	$ 6,128,728	$ 1,092,119
Miscellaneous Industries									
Plastics products	7	5	--	33	193	--	144,083	901,755	--
Sporting goods	--	3	2	--	10	23[15/]	--	39,455	108,102[15/]
Signs, electric, neon	28	13	3	271	198	21	1,859,950	1,446,839	126,282
Stamps and stencils, rubber and metal	3	5	2	16	15	--	105,554	60,906	--
Artificial flowers and feathers	1	1	--		--	--		--	--
Brooms, brushes, mops	1	6	3		111	--		398,252	--
Ice, artificial	2	1	1		--	--		--	--
Instruments and related products	1	2	--		--	--		--	--
Opthalmic goods	2	1	--		--	--		--	--
Orthopaedic, surgical appliances	2	6	--		28	--		83,628	--
Rubber goods, including footwear	1	--	--	61	--	--	349,364	--	--
Statuary, art goods, regalia, novelties	1	9	--		92	--		332,597	--
Toys and games	1	1	--		--	--		--	--
Miscellaneous industries	1	6[16/]	5		76[16/]	532[17/]		386,186[16/]	24,641,341[17/]
Total	51	59	16	381	723	576	$ 2,458,951	$ 3,649,618	$ 24,875,635
Grand Total	1,971	1,534	863	36,792	42,821	11,536	$285,830,811	$270,017,554	$113,627,642

11/ Figures include hydraulic cement.
12/ Figures include hydraulic cement and salt.
13/ Figures include adhesive, coal tar distillation, inks, and toilet preparations.
14/ Figures include "Acids, Alkalies, and Salts," "Compressed Gases," "Toilet Preparations," and "Vegetable Oils."
15/ Figures include "Brooms, Brushes, and Mops."
16/ Figures include clocks, watches and watch cases, hair goods, electric lamps and lamp shades, models and patterns, excluding paper, artificial flowers and feathers, artificial ice, instruments and related products, opthalmic goods, toys and games.
17/ Figures include candles; ice, artificial; stamps and stencils, rubber and metal; jewelry and silverware; machinery, heavy, industrial; nonferrous metal smelting and refining.

Source: Various D.B.S. publications.

Table 91

INDUSTRIAL OPPORTUNITY STUDIES MADE BY
SASKATCHEWAN GOVERNMENT INDUSTRIAL DEVELOPMENT OFFICE
BETWEEN JANUARY 1951 AND DECEMBER 1958

Shotgun Shells
*Meat Packing
Condensed, Evap. Milk
Powdered Milk
Prepared Stock & Poultry Feeds
*Bread & Other Bakery Products
*Bottled Soft Drinks
Distilled, Rectified & Blended Liquors
*Potato Chips
Wool Scouring
Children's Clothing
Canvas Products
Christmas Trees
*Softboard & Hardboard
*Building Boards
Glued Laminated Construction Timbers
*Plywood and Chipboard
Wooden Boxes
*Wood Preserving
Blockboard
Wood Household Furniture, except upholstered
Kraft Paper
Pulp
*Paperboard Boxes
*Insulation Board
Alkalies and Chlorine
*Sodium Sulphate
*Plastic Materials and Elastomers
Charcoal
Paints, Varnishes, Lacquers, Japans, and Enamels
Fertilizers
*Flare Gas
Petro Chemicals
*Petroleum Refining
*Fuels & Asphalt
Leather Tanning & Finishing
*Cement
Pressed and Blown Glass and Glassware
Floor and Wall Tile
*Sewer Pipe
*Concrete Products
Insulation
*Lightweight Aggregate
*Steel Foundries - Pipe
Seamless Tube
Rolling, Drawing & Alloying of Copper, Brass
Sucker Rods
*Welded and Heavy-riveted Pipe
*Skelp
Hand Tools
Nails and Spikes
*Sheet-Metal Products
Oil Burners, Domestic and Industrial
Bottle Caps
Roof Decking
*Agricultural Machinery
Valves and Fittings
*Electrical Welding Apparatus
Storage Batteries
Trucks and Bus Bodies
Motor-Vehicle Parts and Accessories
*Automative Trailers
*Brooms and Brushes
Swelling Bentonite

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* Industries which by August 1959 had established a plant or had expanded.

Table 92

NET IMPORTS AND EXPORTS OF COMMODITIES IN CARLOAD LOTS FROM SASKATCHEWAN AND THE PRAIRIE PROVINCES 1957

Commodity	Saskatchewan Net Exports	Saskatchewan Net Imports	Prairie Provinces Net Exports	Prairie Provinces Net Imports
Wheat	6,050,283		9,019,128	
Corn		186	1,312	
Sorghum grains	227		161	
Oats	449,911		1,095,320	
Barley	999,674		2,133,220	
Rye	78,293		126,019	
Rice	1,060		1,269	
Grain, n.e.s.	5,813		8,976	
Flour, wheat		19,696	469,452	
Meal, corn		9	179	
Flour, edible, n.e.s.	18,934		37,648	
Cereal food preparations	3,643		5,227	
Mill products, n.e.s.	214,082		447,168	
Hay		2,696		141
Straw	86		1,096	
Tobacco	70			262
Cotton in bales		89		301
Cotton, linters, noils, and regins	135		2,002	
Cottonseed oil, cake and meal	228			222
Cottonseed hulls and bran		4		127
Soybeans	651			452
Soybean oil, cake and meal		2,180		10,020
Vegetable and nut oil, cake and meal, n.e.s.	3,537		1,599	
Apples, fresh, not frozen		10,976	36,988	
Bananas, fresh		15,931	33,223	
Berries, fresh, not frozen		33		404
Cantaloupes and melons n.e.s.		443		2,183
Grapes, fresh		1,339		4,619
Peaches, fresh		1,382	2,969	
Pears, fresh		512		2,620
Watermelons		2,369		6,755
Fruits, fresh, not frozen, n.e.s.		7,697		24,342
Fruits, dehydrated, dried, evaporated, n.e.s.		598		4,031
Fruits and berries, fresh frozen		138		536
Coffee		486		4,870
Cabbage		227		3,071
Celery		83		2,589
Lettuce		2,575		12,986
Onions, dry		611		3,355
Potatoes, other than sweet		7,161		5,850
Tomatoes		3,248		15,909
Vegetables, fresh, not frozen		9,752		22,298
Beans and peas, dried	533		13,189	
Vegetables, dried, dehydrated, and evaporated, n.e.s.		20		436
Vegetables, fresh frozen		265		275
Peanuts		219		2,891
Sugar beets	175		4,502	
Malt, n.e.s.	45,349		184,699	
Flaxseed	446,871		566,572	
Seeds, n.e.s.	124,340		187,047	
Horses, mules, ponies and asses	1,930		4,320	
Cattle and calves, single-deck	143,892		210,941	
Calves, double-deck	497		1,732	
Sheep and goats, single-deck	1,600		3,459	
Sheep and goats, double-deck	761		929	
Swine, single-deck	20,414		31,456	
Swine, double-deck	29		92	
Meats, fresh, n.e.s.	9,816		136,052	
Meats, cooked, cured, dried, and smoked	703		11,771	
Packing house products, edible, n.e.s.		1,542	35,030	
Margarine, n.e.s.		1,615		5,660
Poultry, live	61		140	
Poultry, dressed, frozen	3,818		7,268	
Eggs	3,182		2,686	
Butter	6,617		9,970	
Cheese		999		8,313
Dairy Products, n.e.s.	156			42
Wool and mohair in grease	56	515		
Wool and mohair, n.e.s.	116	578		
Hides, skins, and pelts, n.e.s.	3,792	21,803		
Sea food, n.e.s.		789		3,631
Fish and sea animal oil		110		1,456
Anthracite coal, n.e.s.		98		1,766
Anthractie coal to breakers and washeries	84			2,386
Bituminous coal	679,760		761,123	
Coke	34,470		23,425	
Iron ore	353		921	
Aluminum ore and concentrates		102		54
Lead ore and concentrates	185		282	
Zinc ore and concentrates	69		242	
Ores and concentrates, n.e.s.		2,462		4,021
Barytes		182		19,432
Clay and Bentonite	40,062			35,561
Sand, industrial		1,960		58,076
Gravel and sand, n.e.s.	9,554			7,631
Stone and rock: broken, ground, and crushed		239,039	20,422	
Fluxing stone and raw dolomite	3			1,952
Stone, rough, n.e.s.		18,039		2,930
Stone, finished, n.e.s.		408		1,999
Petroleum, crude	191,004		207,273	
Asphalt	47,768		17,797	
Salt	20,049		4,635	
Phosphate rock		62		100,669
Sulphur		343	25,880	
Asbestos		334	5,685	
Gypsum, crude		7,712		22,811
Logs, butts, and bolts	177			4,896
Posts, poles, and pilings, wooden		25,527	73,898	
Wood fuel		158		621
Ties, railroad	1,880			8,044
Pulpwood	91,684		462,496	
Lumber, shingle, and lath		144,779		252,745
Box, crate, and cooperage materials	186			256
Veneer, plywood, and built-up wood		22,461		80,358
Gasoline	52,029		19,393	
Fuel, road, and petroleum residual oils, n.e.s.	122,650		128,197	
Lubricating oils and greases		26,988		39,356
Petroleum products, refined, n.e.s.		1,740		9,055

1/ This table presents an approximation of the net imports or exports of the province or of the Prairie Provinces as far as those commodities were shipped in carload lots. The figures represent the excess tonnage loaded or unloaded in the area concerned; thus they contain an assumption that all freight loaded in the area was exported and all shipments unloaded in the area were imported, and therefore can be taken only as rough guides.

Table 92 (Cont.)

Commodity	Saskatchewan Net Exports	Saskatchewan Net Imports	Prairie Provinces Net Exports	Prairie Provinces Net Imports
Gases, other than petroleum, n.e.s.		462	65,392	
Cottonseed oil		8		340
Linseed oil	1,469			1,181
Soybean oil	24			463
Vegetable and nut oils, n.e.s.	3,251		1,018	
Oils, n.e.s.	73			1,021
Oil foots, sediments, and tank bottoms		13	115	
Rubber, crude, natural, and synthetic	251		226	
Rubber products, n.e.s.		109		2,412
Chemicals, n.e.s.		9,697		8,966
Sulphuric acid		841		6,522
Acids, n.e.s.		3,495		379
Sodium (soda) products	151,337		96,086	
Alcohol, n.e.s.		871	3,754	
Blacks, n.e.s.		111		379
Fertilizers, n.e.s.		21,007	166,993	
Insecticides, fungicides, n.e.s.		1,792		4,958
Tar, pitch, creosote		3,662		17,305
Paint, paint material, putty and varnish	789			13,570
Plastics		94	8,461	
Cellulose articles, n.e.s.		33		275
Drugs, medicines, and toilet preparations		348		1,527
Aluminum: bar, ingot, pig, and slab		33		117
Aluminum, n.e.s.		2,146		3,951
Copper: ingot and pig	23		40,796	
Copper, brass, bronze, n.e.s.		845		1,794
Lead and zinc: bar, ingot, and pig		393	54,932	
Lead and zinc, n.e.s.		27	81	
Magnesium metal and alloy		23	2	
Matte	285			923
Metals and alloys, n.e.s.		43	7,758	
Iron pig	61			6,115
Iron and steel: billet, bloom, and ingot		10	96	
Iron and steel: bar, rod, and slab		19,845		55,788
Iron and steel, n.e.s.		32		1,429
Iron and steel nails and wire, n.e.s.		7,563		26,336
Manufactured iron and steel		34,819		229,448
Cast iron pipe and fittings		1,385		72
Iron and steel pipe and fittings, n.e.s.		130,885		423,274
Tanks, n.e.s.		3,939		6,938
Agricultural implements, n.e.s.		26,448		55,737
Agricultural implement parts, n.e.s.		1,823		3,358
Machinery and machines, n.e.s.		9,418		46,367
Machinery parts		3,856		9,750
Business and office machines, n.e.s.		67		1,348
Railway equipment, s.u. not moved on own wheels	10			115
Railway equipment parts		2,572		4,859
Rails and railway track material, iron and steel		3,387		13,588
Vehicles, other than motor		473		1,802
Automobiles, passenger		21,026		88,970
Automobiles, freight		3,728		17,483
Vehicles, motor, n.e.s.		12,400		30,007
Military vehicles, n.e.s.		59		310
Automobiles and autotrucks, k.d.		256		1,066
Vehicle parts, n.e.s.		3,536		11,168
Airplanes, aircraft, and parts		40		932
Tires and tubes, rubber		5,521		17,168
Guns, small arms, and parts, n.e.s.		15		138
Ammunition and explosives		913		2,882
Cement: natural and portland		68,153	112,155	
Cement, n.e.s.		4,143		4,302
Brick, common		811		258
Brick, n.e.s. and building tile		2,973	7,003	
Refractories	2,709			9,608
Artificial stone, n.e.s.		150	1,134	
Lime, n.e.s.		4,730	37,271	
Plaster: stucco and wall		4,737		1,079
Sewer pipe and drain tile (not metal)		5,210		6,989
Broken or ground brick, blocks, crockery, glass,	432			290
Wood pulp	1,268		28,039	
Scrap paper and rags		131	6,256	
Newsprint paper		8,096	85,593	
Printing paper, n.e.s.		687		8,577
Wrapping paper		2,969		19,846
Paper bags		1,263		6,491
Paper and paper articles, n.e.s.		4,709		26,934
Printed matter, n.e.s.		598		5,396
Paperboard, fibreboard, and pulpboard		2,543		40,318
Wallboard		24,840		6,114
Building paper and prepared roofing materials		5,989		15,608
Insulating materials, n.e.s.		3,994		15,805
Building woodwork and millwork		1,429		5,316
Building materials, n.e.s.		1,151		2,447
Building and houses, fabricated and portable, n.e.s.		1,145		609
Asbestos articles, n.e.s.		7		515
Electrical equipment and parts, n.e.s.		3,465		11,216
Furnaces, heaters, radiators, and parts		357		7,362
Bathroom and lavatory fixtures and sinks		871		3,970
Hardware, n.e.s.		1,607		5,589
Glass		1,271		9,301
Glassware, n.e.s.		478		4,448
Glass bottles, jars, and packing glass, n.e.s.		2,185	3,582	
Chinaware, crockery, and earthenware		767	1,488	
Woodenware		349		827
Household utensils, n.e.s.		120		858
Refrigerators, freezing apparatus and parts		3,174		14,628
Laundry equipment		405		4,101
Stoves, ranges, and parts		687		5,682
Floor covering		3,547		11,688
Furniture, n.e.s.		3,502		11,444
Furniture parts		80		542
Tools and parts, n.e.s.		136		334
Abrasives, other than crude		81		297
Bagging: burlap, cotton, gunny, and jute, n.e.s.		280		1,167
Bags: burlap, cotton, gunny, and jute, n.e.s.		348		264
Cotton cloth and cotton fabrics, n.e.s.		79		789
Cotton factory products		325		5,595
Synthetic fibre and yarns (rayon and nylon)		46		1,210
Cloth and fabrics, n.e.s.		522		3,445

Table 92 (Cont.)

Commodity	Saskatchewan Net Exports	Saskatchewan Net Imports	Prairie Provinces Net Exports	Prairie Provinces Net Imports
Rope, cordage, and binder twine, n.e.s.		3,825		11,504
Boots, shoes, and findings, n.e.s.		63		603
Luggage and handbags, n.e.s.	12			43
Athletic, gymnasium, playground, and sporting equipment, n.e.s.		653		832
Liquors, alcoholic, n.e.s.		5,645		19,294
Wine		1,358		3,810
Liquors, malt		2,855		2,613
Beverages, n.e.s.		28		109
Ice		38		95
Syrup and molasses, refined		490		2,366
Molasses, residual		753	6,287	
Sugar		25,391		11,825
Candy and confectionery		2,545		10,851
Food products, n.e.s., in cans and packages, not frozen		45,903		177,760
Food products, n.e.s., frozen		280		1,753
Starch		1,352		4,694
Soap and cleaning and washing compounds		7,558		30,398
Matches		336		1,423
Feeds, animal and poultry, n.e.s.	14,537		81,320	
Manufacturing tobacco, n.e.s.	103			2,850
Cigarettes		550		8,756
Containers, metal		1,575		15,916
Containers, wooden		728		307
Containers, fibreboard and paperboard, k.d.		2,482		3,570
Containers, n.e.s.		525		2,419
Containers, returned empty		640		2,973
Scrap iron and scrap steel	35,983		69,197	
Iron and steel borings, turnings, etc.		8	211	
Furnace slag		1		3,250
Waste material for remelting, n.e.s.		2,521		1,765
Waste materials, n.e.s.		1,432		7,200

Source: Railway Freight Traffic Year Ended Dec. 31, 1957, D.B.S., Public Finance and Transport Division, pp. 68-73, Table 11, pp. 80-85, Table 13, pp. 56-61, Table 9.

Table 93

SELECTED IMPORTS INTO THE PRAIRIE PROVINCES FOR CONSUMPTION 1957

Articles Imported	Unit of Quantity	Saskatchewan		Manitoba		Alberta		Prairie Provinces	
		Quantity	Value (dollars)	Quantity	Value (dollars)	Quantity	Value (dollars)	Quantity	Value (dollars)
Agricultural Products - Mainly Food									
Vegetables, frozen, 1 lb or less	lb	7,147	$ 1,176	81,987	$ 15,655	100,165	$ 18,416	189,299	$ 35,247
Tomatoes canned	lb	2,211,290	166,680	1,888,584	139,677	2,751,302	207,426	6,851,176	513,783
Tomato juice except concentrated	lb	5,930,645	375,795	9,557,875	600,620	8,213,512	495,574	23,702,032	1,471,989
Asparagus in cans	lb	10,167	2,285	49,607	10,060	93,557	22,549	153,331	34,814
Corn in cans	lb	1,103,960	141,249	1,101,006	141,227	1,108,185	145,557	3,313,151	428,033
Peas in cans	lb	302,546	36,075	683,313	79,694	113,928	12,970	1,099,787	128,739
Vegetables, n.e.s., in cans	lb	396,416	30,973	615,323	51,408	529,196	47,796	1,540,935	130,177
Biscuits sweetened, n.e.s.	lb	20,283	9,505	337,158	116,401	76,989	31,849	434,430	157,755
Sugar candy confectionery, n.e.s.	lb	137,797	28,740	1,196,269	262,377	190,739	42,424	1,524,805	333,541
Animals and Animal Products									
Boots and shoes, men's leather	pair	5,265	29,911	34,525	147,305	35,389	220,148	75,179	397,364
Boots and shoes, women's leather	pair	10,002	47,673	47,166	233,300	55,086	250,397	112,254	531,370
Boots and shoes, children's leather	pair	6,073	5,373	13,445	19,211	8,333	16,429	27,851	41,013
Gloves, mitts, leather, n.e.s.			26,217		66,721		80,978		173,916
Harness and saddlery			25,095		14,274		81,872		121,241
Canned meats, poultry, game, n.e.s.	lb	157,050	39,487	580,131	179,795	117,845	29,674	855,026	248,956
Fibres, Textiles and Products									
Smocks, overalls, woven cotton, men's	lb	37,485	73,620	5,371	9,478	25,139	46,508	67,995	129,606
Gloves, mitts and mittens, wool	doz pair	1,526	7,226	5,516	35,582	3,613	20,578	10,655	63,386
Socks, stockings, wool	doz pair	2,077	12,028	16,800	91,327	8,223	55,642	27,100	158,997
Clothing, n.e.s., wool knitted, children's	lb	2,117	10,941	19,664	96,973	7,781	40,172	29,562	148,086
Clothing, n.e.s., wool knitted, women's	lb	4,027	36,000	83,154	522,337	23,505	236,254	110,686	794,591
Clothing, n.e.s., wool knitted, men's	lb	2,134	10,956	70,201	70,201	12,700	92,553	85,035	173,710
Underwear, knitted, synthetic	lb	368	1,302	14,638	41,001	2,027	8,128	17,033	50,431
Wood, Wood Products, and Paper									
Furniture mainly of wood			83,857		350,061		554,124		988,042
Building and insulating board	lb	1,610,728	160,621	2,835,164	331,316	5,280,945	609,406	9,726,837	101,343
Roofing paper	lb	14,103	854	183,143	7,239	73,838	6,114	271,084	44,207
Paper bags and sacks	lb	9,482	2,021	46,846	46,846	31,006	11,503	87,334	60,370
Containers, paperboard, n.e.s.	lb	338,752	49,215	93,359	93,359	173,554	41,566	605,665	184,140

Table 93 (Cont.)

Articles Imported	Unit of Quantity	Saskatchewan Quantity	Saskatchewan Value (dollars)	Manitoba Quantity	Manitoba Value (dollars)	Alberta Quantity	Alberta Value (dollars)	Prairie Provinces Quantity	Prairie Provinces Value (dollars)
Iron and Its Products									
Pipe tubes for boilers	cwt	562	$ 10,173	10,000	$ 189,954	2,964	$ 73,520	13,526	$ 273,647
Pipe, seamless, 5 cts. per lb, n.e.s.	cwt	47	3,226	6,905	120,829	1,939	65,562	8,891	189,617
Pipe, wrought, over 10 one-half inch	cwt	413,409	3,608,431	2,537,913	20,236,512	44,266	461,323	2,995,598	24,306,266
Pipe, wrought, less 10 one-half inch	cwt	27,172	234,502	15,767	194,867	36,880	386,168	79,819	815,537
Pipe, wrought, n.e.s.	cwt	3,439	37,495	2,024	27,911	25,524	186,155	30,987	251,561
Pipe fittings couplings, n.e.s.			145,385		197,599		842,214		1,185,198
Casing gas, water, or oil well	cwt	741,355	7,578,014	242,980	2,494,907	1,483,860	15,838,718	2,468,195	25,911,639
Wire rope cable, n.e.s.	cwt	2,843	97,074	654	19,082	2,724	57,022	6,221	173,178
Wire of iron or steel, n.e.s.	cwt	65	953	2,406	30,398	4,196	51,930	6,667	83,281
Harvesters and parts	no.	698	730,876	540	1,257,968	389	519,685	1,627	2,508,529
Rakes, horse or power, and parts	no.	1,232	329,512	1,658	439,727	1,345	378,651	4,235	1,147,890
Rakes, n.e.s.	doz	66	1,025	605	1,699	1,998	21,095	2,669	23,819
Scythes	doz	141	2,316	275	5,108	395	5,301	811	12,725
Cultivators, scufflers, and parts			779,410		560,635		640,829		1,980,874
Harrows, discs, and parts			41,796		128,064		114,434		284,294
Harrows and parts, n.e.s.			130,833		68,384		79,309		278,526
Fanning mill peaviners and parts	no.	86	20,138	210	55,722	5	38,773	301	114,633
Grain, hay grinders, and parts	no.	192	43,153	225	55,506	578	215,293	995	313,952
Hay presses and parts	no.	1,675	1,593,332	1,103	1,262,962	1,168	1,255,239	3,946	4,111,533
Manure spreaders and parts	no.	243	90,216	418	159,906	537	180,389	1,198	430,511
Post hole diggers and parts	no.	465	25,263	1,636	9,783	931	30,787	3,032	65,833
Spades and shovels, n.e.s.	doz	265	1,076	233	3,352	1,571	28,993	2,069	33,421
Nuts, bolts, washers, and rivets	lb	127,455	48,095	213,590	111,844	257,526	112,073	592,571	272,012
Refrigerating machinery and parts			121,918		229,722		275,590		627,230
Lawn mowers, power and parts	no.	141	13,912	2,155	133,932	1,125	88,609	3,421	236,453
Lawn mowers, n.e.s.	no.	1,968	14,962	5,695	39,021	4,993	40,715	12,656	94,698
Air conditioning apparatus, n.e.s.			64,066		174,143		524,798		763,007
Baths, bathtubs, iron or steel			39,364		80,284		28,893		148,541
Basins, closets, and sinks			32,219		75,900		75,468		183,587
Valves of iron or steel, n.e.s.			468,531		396,516		2,287,402		3,152,449
Furnace, domestic, warm air	no.	1,282	174,149	947	130,001	4,840	549,972	7,069	854,122
Heating, cooking apparatus, n.e.s.			225,974		276,980		703,157		1,206,111
Parts of heating or cooking apparatus			84,128		177,237		293,703		555,068
Water heaters, gas	no.	5,758	285,415	1,478	77,308	7,285	393,486	14,521	756,209
Water heaters, electric	no.	456	23,892	1,067	56,309	542	12,246	2,065	92,447
Nonferrous Metals and Products									
Aluminum household holloware			31,363		78,645		86,377		196,385
Chemicals and Allied Products									
Preparations, weed killing			499,197		746,420		144,055		1,389,672
Liquid soaps	lb	10,288	9,056	135,879	34,658	131,317	30,667	277,484	74,381

n.e.s. = not elsewhere specified.

Source: Department of Co-operation and Co-operative Development, Province of Saskatchewan, Regina, 1957.

Appendix B

INDUSTRIAL DEVELOPMENT PROMOTION

STANDARD INDUSTRIAL SURVEY SUMMARY REPORT

Outlined by the Industrial Development Committee

California State Chamber of Commerce

PALO ALTO, SANTA CLARA COUNTY, CALIFORNIA

Published by the Palo Alto Chamber of Commerce, January, 1959

1. **LOCATION:** Palo Alto, a city with an estimated population of 50,000 in January, 1959, had 25,475 residents in April, 1950. Most recent population of the Palo Alto area is 75,000, and of Santa Clara County 547,110. It is situated in the mid-Peninsula region, 6 miles south of the nearest seaport terminal at Redwood City, 385 miles north of Los Angeles, and 32 miles south of San Francisco at an elevation of 1½ to 1835 feet.

2. **CLIMATE:**

	Avg. Temperature degrees			Rain	Humidity		
	MIN.	MEAN	MAX.	(INCHES)	5 A.M.	NOON	5 P.M.
January	37.3	46.8	55.8	3.28	----	64	68
April	45.0	56.2	67.5	.97	----	55	60
July	53.4	65.6	77.8	.01	----	60	64
October	47.7	59.9	71.9	.74	----	55	60
Year	46.0	57.1	68.3	15.79	----	58	62

3. **TRANSPORTATION:** Palo Alto is served by Southern Pacific Railroad, Pacific Greyhound and Peerless bus lines. Air transportation is by Pacific Air Lines from San Jose Municipal Airport, 13 miles south; and by all major airlines from San Francisco and Oakland International Airports, 16 miles north. The Peninsula is served by 5 freight forwarders, 31 highway common truck carriers and 21 city carriers. Slick and Flying Tiger also operate freight pick-up services.

4. **INDUSTRIAL SITES:**

(A) There are approximately 500 acres in the Palo Alto area zoned for non-obnoxious industry; about 50 percent is vacant and available in parcels ranging in size from 1 to 72½ acres. Typical sale prices during 1958 ranged from $15,000 to $65,000 per acre. The terrain is generally level. Drainage is mostly good, some fill needed. Subsoil is mostly adobe and piling is not required except for heavy buildings near Bayshore highway. Size of Water mains: 8″ and up. Size of Sewer lines: 8″ to 18″. Availability of Gas lines: ample. Availability of Electric lines: good. Availability of Rail lines: Southern Pacific Railroad spur tracks available to some areas.

(B) Description of sites on or off rail lines, zoned or unzoned, outside city limits or in other tracts or districts: On the fringe area of Palo Alto there are approximately 250 acres fully developed for immediate use with facilities being installed as required near the present light manufacturing area on Stanford University lands. In addition, there are approximately 250 acres east and southwest of the city with some industrial facilities available. Also, several private developers in Santa Clara County have large industrial sites to be developed as required.

Site data compiled in cooperation with the Palo Alto Realty Board.

5. INDUSTRIAL WATER SUPPLY:

a. Name of Supplier: San Francisco Water Dept. and 14 deep wells in City of Palo Alto.

b. Maximum gallons delivered: 9,100,000 gallons daily. Unlimited supply available.

c. Hardness 250 p.p.m. Treatment required for boiler use.

d. Cost per 1,000 gallons in quantities of 100,000 gallons per month: 33c.
Cost per 1,000 gallons in quantities of 1,000,000 gallons per month: 29c.

6. GAS AND ELECTRIC UTILITY SERVICES:

a. Gas: Name of Supplier: Supplied by Pacific Gas & Electric Co. and distributed by City of Palo Alto.
Cost of Industrial Gas (Interruptible Service)

1 Therm	Monthly Delivery Therms	Average Per Therm	Average Per MCF	B.T.U. Content Per Cubic Foot
100,000	500,000	3.37c	37.1c	
B.T.U.	50,000	3.73c	41.1c	
	5,000	4.02c	44.3c	1100

b. Electric Power: Name of Supplier: Supplied by Pacific Gas & Electric Company* and distributed by City of Palo Alto.

Maximum Demand	Monthly Usage KWH	Net Mo. Elec. Bill	Av. Cost Per KWH	Monthly Usage KWH	Net Mo. Elec. Bill	Av. Cost Per KWH
1000 KW	200,000	$2,774	1.387c	400,000	$4,239	1.060c
500 KW	100,000	1,503	1.503c	200,000	2,264	1.132c
300 KW	60,000	933	1.555c	120,000	1,404	1.170c
150 KW	30,000	505	1.683c	60,000	759	1.265c
75 KW	15,000	292	1.947c	30,000	437	1.457c

* Subject to possible primary voltage discount up to 4 percent.

7. GOVERNMENT FACILITIES—TAX AND INSURANCE RATES:

a. Palo Alto has the City Manager type of government.
Assessed valuation 1958-59 is $121,307,390. Ratio to county assessment is 1.12. Bonded debt of the city was $9,602,250 on January 1, 1959.

b. Combined total property tax rates 1958-59 per $100 assessed value:
Actual City, $.75; Adjusted City, $.84. County, $1.856; School and Other, $6.064-6.886*.

Unincorporated Area:
County—Outside, $1.93; School, $4.564-4.571; Other Dist., $1.594-3.540; Total, $6.158-8.111*.
* Varies with area.

c. City Sales Tax: 1%. Total receipts $880,122.47 from Nov. 1, 1957 to Nov. 1, 1958.

d. Police Department: Palo Alto has 57 men; 4 communication operators at central station. Equipment includes 13 police cars and 6 motorcycles with 3-way radio.

e. Fire Department: Palo Alto has 59 men, 4 station houses with modern equipment.

f. Insurance Classification: City, 3; Fringe Area, 5; Other, 7.

g. Daily capacity of Sewer System in gallons: 20 million.
Service to Fringe Areas: To approximately 1½ miles.

h. New Projects authorized for improvement of city services: New electrical distribution system completed; new street lighting installed in residential districts; new 2nd senior high school completed; new $5,000,000 community hospital and $20,000,000 Medical Center under construction; 60-acre $15,000,000 Stanford Shopping Center completed; 15-acre Town and Country Village Shopping Center completed; new Municipal Golf Course completed; Airport and small boat harbor improvements completed; 1,000-bed Veterans Administration Hospital under construction; extensive Stanford University land development program underway including medical center, professional center, residential areas, and additions to industrial park. Additional park sites are being acquired and existing playgrounds and parks improved. Additional off-street parking projects and beautification of parking areas are underway. Two new library buildings have recently been completed.

8. POPULATION GROWTH AND TRENDS:

	April 1940	April 1950	July 1953	January 1958
Population in County	174,949	290,547	360,000	547,110**
Population in Township	19,383	34,404	49,682	66,707
Population in City Limits	16,774	25,475	35,252	48,003
No. of Occupied Dwelling Units	5,510	8,478	11,856	14,937
School Enrollment—Grades 1-6	1,900	3,580	4,736	6,427
No. of Water Connections	5,754	9,667	13,146	17,331
No. of Electric Meters—Residential	5,146	7,905	10,655	15,160
No. of Electric Meters—Comm.-Ind.	1,379	1,658	1,853	2,749
*No. of Telephones—Residential	4,453	7,839	13,407	42,526
*No. of Telephones—Business	1,113	1,959	3,351	20,026
No. of Gas Meters—Residential	5,893	8,646	12,052	16,875
No. of Gas Meters—Comm.-Ind.				

*Includes all telephones with DAvenport exchange for Palo Alto, East Palo Alto, Stanford, Menlo Park and part of Atherton. Number of subscribers is 62,552.

**574,800 in July, 1958.

9. CHARACTERISTICS OF CITY POPULATION AND LABOR FORCE:

By Race*	Male	Female	Total
TOTAL POPULATION	22,780	25,223	48,003
White	21,737	24,220	45,957
Non-White	1,043	1,003	2,046
Negro	436	480	916
Other	607	523	1,130

*March 13, 1958, Special Census

10. EMPLOYMENT IN THE PALO ALTO LABOR MARKET AREA—SEPTEMBER, 1958:

Includes Palo Alto, Stanford, Menlo Park, Atherton, Los Altos and Mountain View.

Estimates of the Palo Alto office of the State Department of Employment indicate a population of 204,800 in the Palo Alto labor market area. Estimated total employment in this area is 47,500. Non-agricultural employment is estimated as 4,300 in construction, 12,200 in manufacturing, 1,600 in transportation, communication, and other utilities; 10,300 in wholesale and retail trade; 1,600 in finance, 23,100 in services, and 1,400 in government.

11. OTHER CHARACTERISTICS OF THE LABOR FORCE:

Extent of Unionization: The community is predominantly non-union. Employees in most organized industries are affiliated with A.F. of L. unions. Labor relations in this area are excellent and provide an outstanding climate for full production with a minimum of labor disputes.

12. HIRING PER HOUR WAGE RATES—JULY, 1958:

Male workers: Machinist (Maintenance) $2.69; Punch-press Operator, $2.30-2.40; Carpenter (Maintenance) $2.75-3.375; Electrical Repairman, $3.00-4.16; Laborer Carpenter, $3.375; Sorting Machine Operator (canning), $1.59-1.75; and Truck Driver, Heavy, $2.37-3.35; Female workers: Cutter, Hand (canning) $1.59 per hour; Sewing Machine Operator (Clean, Dye and Press) $1.25-1.65; Household Servants, by day, $1.25-1.50 per hour; Household Servants, live in, $150-200 per month. Monthly rate for Stenographer, $300; Clerical, $255.

13. HOUSING AVAILABILITY, PRICES AND RENTALS:

The housing census of April, 1955, showed 13,251 occupied dwelling units,* compared to 8,478 in April, 1950, of which 60 percent were owner-occupied. Of the renter-occupied dwellings in 1950, 1.9 percent rented for less than $20 per month, 25.2 percent for $20 to $39 per month, 30.2 percent for $40 to $59 per month, and 13.6 percent from $60 to $74 per month, with 29.1 percent in excess of $75 per month. Median contract monthly rental was $54.41.

Since 1950 rents have risen 35-40 percent.

There are 7 hotels in Palo Alto with 285 rooms and 37 motels in the area with approximately 1,200 units.

*There were 15,080 occupied dwelling units as of the March 13, 1958, Special Census.

14. COMMUNITY FACILITIES:

Palo Alto has one general hospital with 350 beds. Under construction is the new $5,000,000 Palo Alto Community Hospital with 425 beds in the new Stanford Medical Center. Other medical facilities include 165 physicians and surgeons, 86 dentists, a 1,400-bed Veterans Administration Hospital 2 miles north of Palo Alto, and a 1,000-bed Veterans Administration Hospital now under construction.

Educational facilities include Stanford University, 2 high schools, 3 junior high schools, 21 elementary schools, 2 private girls' schools, 1 military academy, 1 school of creative education, and 3 business schools.

There are 41 churches, 5 libraries, 1 newspaper, and 11 banks serving Palo Alto.

Recreational facilities include 6 theatres, 16 parks, 10 playgrounds, and nearby beach and mountain resorts. 1,200 acres of foothill lands are being acquired for a regional park. Nearby are Stanford Stadium and sunken baseball diamond, Palo Alto Small Boat Harbor, Palo Alto Airport, Stanford Golf Course, Palo Alto Municipal Golf Course, Stanford Museum, Hoover Tower and Library, Stanford Memorial Church, Stanford Art Gallery and Junior Museum.

15. MANUFACTURING:

There are 192 manufacturing firms in the city. Leading groups of products are: Electronics instruments and research, radio communication systems, helicopters, plastics, household and garden equipment, metal and wood products, printing and publishing, food products, film processing, medical instruments and research.

Prominent manufacturing and research firms in the city and immediate adjacent area include:

Name of Company	Number of Employees	Product
Admiral Corporation	40	Electronics research
Durant Insulated Pipe Company	40	Pipe manufacturing
Eastman Kodak Processing Laboratory	400	Film processing
Fairchild Semiconductor Corporation	100	Electronics components
Farnsworth Electronics Company	60	Electronics manufacturing
Fisher Research Laboratory, Inc.	40	Electronics instruments
General Electric Computer Laboratory	100	Electronics research
General Electric Microwave Laboratory	385	Research
Ginn & Company	35	Book publishers
Hewlett-Packard Company	1,600	Electronics instruments
Hiller Aircraft Corporation	875	Helicopter manufacturing and research
Houghton Mifflin Company	30	Book publishers
Kaar Engineering Corporation	90	Electronics instruments
Kaiser Aircraft & Electronics, Division of Kaiser Industries Corporation	70	Electronics instruments
Link Aviation, Inc.	75	Electronics research
Lockheed Aircraft Corporation, Missile Systems Division	2,300	Electronics research
National Press	35	Printers and publishers
Palo Alto Engineering Company	95	Electric transformers
Philco Corporation	425	Electronics
Preformed Line Products Company	40	Power line cable
Royal-McBee Corporation	62	Headquarters office
Scott, Foresman & Company	55	Book publishers
Shockley Transistor Corporation	60	Transistor research
Spinco Division of Beckman Instruments, Inc.	200	Pharmaceutical research and medical instruments
J. W. Stacey, Inc.	35	Technical and scientific book publishers
Stanford Research Institute	1,500	Research
Stanford University Press	95	Book publishers
Sylvania Electric Products, Inc., Microwave Physics Laboratory	50	Electronics research
Varian Associates	1,200	Electronics instruments

Survey prepared by the Palo Alto Chamber of Commerce in cooperation with the Industrial Development Committee, California State Chamber of Commerce, January, 1959.

Check List for a Community Industrial Development Program

General

1. Organize community industrial or area development council and committees.

2. Study successful industrial and area development programs of other communities.

3. Study what existing industry likes and dislikes about your community, why industries moved to your community or started there, why some industries moved away or failed.

4. Consider what industries are best suited to the community and would further a balanced pattern of diversification. Study especially those industries that are expanding most rapidly in the United States and Canada as a basis for developing diversified industries.

5. Initiate a local educational program on advantages and need for industrial development.

6. Establish an industrial development corporation to provide various types of assistance to new or existing industries.

7. Prepare an industrial promotion brochure. Make survey of locally available natural resources and determine industrial uses; make results known to concerned industries.

8. Develop and maintain a list of industrial prospects.

9. Develop and zone for industry suitable industrial sites.

10. Modernize old industrial facilities and build new ones when necessary.

11. Prepare and properly distribute industrial promotion and advertising materials.

12. Establish a clearinghouse of information on sources of venture capital for new enterprises.

13. Encourage establishment of new small business enterprises through publishing information on local market needs and opportunities attendant upon new developments, such as highways, or water and power projects.

Services to Existing Industry

1. Establish an information clearing service for existing industry.

2. Suggest sources of business expansion loans (banks, individuals, insurance companies, government).

3. Suggest sources of market and product development assistance (market research and advertising agencies, consulting engineers, research organizations, schools of engineering, departments of government, etc.).

4. Arrange and hold local business and industry improvement clinics, with assistance of local trade associations, government agencies, and university engineering schools.

Retail and Service Trade Development

1. Make a trade area survey to find out where people in the area buy commodities and services and why they buy where they do.

2. Make a survey of services needed in the community and its trade area for use in counseling prospective, as well as established, businesses.

3. Determine what improvements in retail and service businesses are desired by people residing in the trade area and make information available to local businessmen.

4. Encourage seasonal retail businesses to consider adding goods and services to fill in during low periods of sales and to level out sales by better timing of promotional efforts.

5. Initiate an educational program on the part of banks, newspapers, and schools, on the advantages of sound investment.

6. Encourage store modernization and a community clean-up, fix-up program.

Tourist and Recreation Industry

1. Encourage improvement of local facilities serving tourists, through survey of tourist reactions.

2. Identify, improve, and publicize local tourist attractions.

3. Study potential tourist sources, and direct promotional efforts to those sources.

4. Encourage orderly and sound development of new services in newly established or underutilized recreational areas.

Local Government

1. Review tax system and public utility services to assure that they do not discourage industrial and business development.

2. Plan and provide adequate schools, recreational facilities, transportation services, hospitals, utility services, and police and fire protection.

3. Make forward-looking capital improvement budgets, on the basis of the above, which can be accelerated in times of local unemployment.

4. Institute, if necessary, a vocational guidance and training program in cooperation with the school system, develop an apprenticeship training program, and provide training opportunities for the handicapped.

5. Participate in a local area development program by providing facts on the community and by cooperating on studies which are beyond the scope of development committees.

Agricultural Development

1. Secure the assistance of a college of agriculture in determining what food items being shipped in from distant points might be more profitably grown locally.

2. Determine what kinds of new industries might be developed in rural areas.

3. Secure the assistance of a college of agriculture in determining the need and possibilities for establishing food and fiber processing plants.

4. Secure the assistance of a college of agriculture in instituting program and community contests to improve farm practices and to modernize and improve farm buildings and homes.

5. Secure more active appreciation and support from town and tradespeople with respect to state and local agricultural improvement programs.

Check List of Industrial Location Factors

The Industrial Pattern

1. What products, and in what volume, are now produced by local industries (including handwork and manufactured products)?

2. What local factories have idle tool capacity, not now employed?

3. What new products could be manufactured by present industries?

4. What waste products are derived in large quantities from local production?

5. What by-products come from local industry?

6. What materials used by local industries are bought elsewhere and shipped here?

The Labor Situation

1. What is the size and character of the community's labor force, by age, sex, skills, training, and by place of residence?

2. What types of labor are now in short supply locally?

3. What types of labor now show a local surplus?

4. How much labor is now employed elsewhere? How much of this labor would prefer employment nearer home?

5. How much of local labor comes from outside the community and from what distances? How much unnecessary transportation is involved in these cross-currents?

6. What local facilities exist for training labor for new jobs?

Other Industrial Essentials

1. What are the available industrial sites and buildings?

2. What are the possibilities of constructing new buildings for deserving industries? (Construction time, construction cost, occupancy dates.)

3. What raw materials are available locally? (Production and resources of local mines, farms, and forests, in sufficient detail for practical use.)

4. What are the community financial resources? (Capitalization, deposits, and surplus of local banks and trust companies.)

Public Utilities

1. What are the electricity and gas resources and rates? (Both industrial and domestic rates.)

2. What is the capacity and present load of the water supply? The chemical analysis of the water? The possible future supply?

3. What is the sewage or waste disposal type and capacity? Possible future capacity?

4. What are the transportation facilities? (Railroad connections, terminals, and time of delivery of freight to and from industrial centers and major markets. Highways, main routes, traffic or parking problems, airports and size of runways, accessibility and facilities of airports.)

The Local Government

1. What is the nature of the local government?

2. What services are supplied by the local government?

3. What type of fire protection exists and what is fire loss record?

4. What is the size of police force and local crime record?

5. What is the tax rate and what are the community debts (including both bonded and short-term obligations)? What is the assessed and market valuation of local real estate? What has been the trend of debts, tax rates, tax delinquencies, and the value of real estate over the past ten years?

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